DECEMBER 2008

SACRAMENTO VALLEY
WATER QUALITY COALITION

Monitoring and Reporting Program Plan

Semi-Annual Irrigation Season Monitoring Report 2008

Prepared for
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SUMMARY OF MONITORING PROGRAM.

The Sacramento Valley Water Quality Coalition (Coalition) has developed and implemented a Monitoring and Reporting Program Plan (MRPP) to meet the requirements of the *Conditional Waiver for Irrigated Lands* (hereinafter abbreviated as *ILRP* for *Irrigated Lands Regulatory Program*) and subsequent amendments to the *ILRP* requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833). The sampling and analytical methods used in the Coalition and subwatershed monitoring programs have been approved by the Central Valley Regional Water Quality Control Board (Water Board) in the Conditional Approval of Watershed Evaluation Report (WER) and MRPP issued December 2, 2004 pending submittal of additional documentation, which was subsequently provided on January 19, 2005.

To achieve the objectives of the Monitoring and Reporting Program (MRP), the Coalition initially implemented a phased MRPP that evaluated samples for the presence of statistically significant toxicity of sufficient magnitude in the initial sample to trigger follow-up actions designed to identify constituents causing toxicity. The Coalition is also continuing to evaluate samples for violations of applicable numeric water quality objectives to trigger follow-up actions. The Coalition is evaluating the degree of implementation of current management practices in priority watersheds and recommending additional practices as water quality results indicate a need to do so. The Coalition is committed to the principle of adaptive management to control specific discharges of waste that are having an impact on water quality. This iterative approach allows for the most effective use of scarce human and fiscal resources. The 2008 monitoring effort has been conducted in coordination with the Northeastern California Water Association, the Napa County Putah Creek Watershed Group, and the Upper Feather River Watershed Group Proposition 50 Team. The Coalition is also coordinating with the California Rice Commission (CRC) under the December 2004 Coalition- CRC Memorandum of Understanding.

The parameters monitored by the Coalition are as specified in the *ILRP* requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833). The following environmental monitoring elements are included in the Phases 1-3 of the Coalition's MRPP:

- Water column and sediment toxicity
- Physical and conventional parameters in water and sediment
- Organic carbon in water
- Pathogen indicator organisms in water
- Trace metals in water and sediment
- Pesticides in water and toxic sediments
- Nitrogen and phosphorus compounds in water

Note that not all parameters are monitored during every phase of monitoring. Specific individual parameters measured and the relevant Phases of the Coalition monitoring effort are listed in **Table 1**. Note that this list is consistent with the *ILRP* in effect when the Coalition monitoring program was continued in 2008.

A total of 27 regular and Management Plan sites were monitored by the Coalition and coordinating subwatershed monitoring programs during the 2008 Irrigation Season. A map of these sites is presented in **Figure 1**. As required by the *ILRP*, Coalition monitoring events includes storm season monitoring and irrigation season monitoring. The sites and annual frequency of samples to be collected for the Coalition's 2008 monitoring are summarized in Table 4. This *2008 Irrigation Season Semi-Annual Monitoring Report* (SAMR) includes results only for the Irrigation Season 2008 (April – October 2008).

Sample collection and analysis has been performed by the following agencies and subcontractors. Pacific EcoRisk (Fairfield, California) conducts sampling and performs toxicity analyses for all sites except for the following:

- Kleinfelder (Sacramento, California) conducts sampling and perform toxicity analyses for the sites coordinated with the California Rice Commission (CRC) ;
- The Northeastern California Water Association conducts sampling for the three Pit River subwatershed sites;
- Napa County Resource Conservation District staff conducts sampling for the two Napa County sites in the Lake-Napa subwatershed.

Caltest Analytical Laboratory (Napa, California), Basic Lab (Redding, California), and the Tate Laboratory in the University of California Department of Plant Sciences conduct all conventional and microbiological analyses;

CRG Marine Laboratories (Torrance, California) and APPL (Fresno, California) conduct pesticide analyses.

MANAGEMENT PRACTICES AND ACTIONS TAKEN

To address specific water quality exceedances, the Coalition and its partners developed two management plans prior to 2008, the *Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley* and the *Yolo Technical Report*. The *Yolo Technical Report* was incorporated into a larger management plan for the Sacramento Valley, *Water Quality Management Plan,* submitted to the Regional Board on December 1, 2008. The Coalition's Management Plan is undergoing Regional Board review. The Coalition also developed a *Landowner Outreach and Management Practices Implementation Communications Process for Monitoring Results (Management Practices Process)* to address exceedances.

The Coalition and its subwatersheds, working with the Coalition for Urban/Rural Environmental Stewardship (CURES), stand committed to working with the Regional Water Board and its staff to implement the *Management Practices Process* to address water quality problems identified in the Sacramento Valley. The strategic approach taken by the Coalition is to notify the subwatershed landowners, farm operators, and/or wetland managers about the cause(s) of toxicity and/or exceedance(s) of water quality standards. Notifications are targeted at growers who operate directly adjacent to or within close proximity to the waterway. The broader outreach program, which includes both grower meetings and the notifications distributed through direct mailings, encourages the adoption of BMPs and modification of the uses of specific farm and wetland inputs to prevent movement of a constituent of concern into Sacramento Valley surface waters.

RESULTS AND CONCLUSIONS

The Coalition submits this *2008 Irrigation Season Semi-Annual Monitoring Report* (SAMR) under the Water Board's *ILRP*. The SAMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize irrigated agricultural and wetlands related water quality in the Sacramento River Basin. This SAMR characterizes potential water quality impacts of agricultural drainage from a broad geographic area in the Sacramento Valley from April 2008 through October 2008. For the period of record in this SAMR (April 2008-October 2008), samples were collected during seven scheduled Irrigation Season events and additional follow-up sampling at a total of 27 different locations, including follow-up sample sites.

To summarize, the results from the 2008 Irrigation Season monitoring continue to indicate that there are not major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin. For the sites with observed toxicity, the Coalition and its subwatersheds took or are taking the appropriate actions to address these issues. By its nature, the SAMR focuses in detail on the small number of sites and samples that exhibited toxicity and exceedances of conventional and microbiological parameters, as well as the actions taken and planned by the Coalition and its members to address these issues.

From April 2008 through October 2008, 307 water column toxicity tests were conducted with three aquatic species on 106 samples from 18 different sites. There were 9 statistically significant water column toxicity exceedances with reductions greater than 20% compared to control in Coalition Irrigation Season samples (6 *Ceriodaphnia* tests, 3 *Selenastrum* tests, and no *Pimephales* tests). In total, 3% of all tests and 8.5% of water samples exhibited a statistically significant reduction in invertebrate or fish survival or algae cell density of greater than 20% compared to the control. Observations of statistically significant toxicity are considered exceedances of the Basin Plan narrative objective for toxicity and were reported to Water Board staff by the Coalition in Exceedance and Communication Reports, as required by the *ILRP* and the Coalition's MRPP. No sediment toxicity was observed in the 36 samples tested.

Chemical results were evaluated for all of the cases of observed toxicity. In two of these cases, the toxicity to *Selenastrum* was explained by the concentrations of chlorpyrifos or diuron. For the three samples that triggered Toxicity Identification Evaluation (TIE) procedures to investigate the cause of toxicity, toxicity was not persistent in two of the samples (i.e., there was no significant toxicity in the untreated baseline TIE sample), indicating a rapid breakdown of the source of toxicity, and therefore probably a short duration of toxicity in ambient waters.

When detected, pesticides rarely exceeded applicable objectives, and were typically not associated with toxicity. Two registered pesticides (diazinon and atrazine) and 2 unregistered legacy organochlorine pesticides (dieldrin and DDE) exceeded applicable water quality objectives in a total of 9 Irrigation Season 2008 samples. There were no observed exceedances of the Basin Plan diazinon objective in the 2008 Irrigation Season, In only two cases were detected elevated pesticide concentrations (chlorpyrifos and diuron) associated with instances of toxicity.

Many of the pesticides specifically required to be monitored by the *ILRP* have rarely been detected in Coalition water samples, including glyphosate, paraquat, and all of the pyrethroid pesticides. Glyphosate, one of the most widely used agricultural pesticides, has been detected in only 7 Coalition samples to date, and has never approached concentrations likely to cause toxicity to sensitive test species. Over 98% of all pesticide analyses performed to date for the Coalition are below detection. This indicates that monitoring for many of these pesticides in

water is unlikely to provide meaningful results regarding sources or needs for changes in management practices. Based on these results, the Coalition has proposed much more focused monitoring of ILRP pesticides in 2009, when the recently adopted revised ILRP MRP will be implemented. Similarly, the Coalition has proposed to conduct more focused monitoring of most trace elements (arsenic, cadmium, lead, nickel, selenium, and zinc) in 2009 because Coalition monitoring has demonstrated that these metals do not exceed objectives and are not likely to cause adverse impacts to aquatic life or human health in waters receiving agricultural runoff in the Coalition watershed.

Exceedances of adopted Basin Plan objectives and advisory limits were observed for boron, conductivity, dissolved oxygen, *E. coli* (not approved by State Board), pH, and total dissolved solids (**Table 20**). There were no exceedances of water quality objectives for monitored nutrient compounds. The majority of exceedances of adopted numeric objectives consisted of boron, dissolved oxygen, and *E. coli*. Although agricultural runoff and irrigation return flows may contribute to exceedances of these objectives, all of these parameters are controlled or significantly affected by natural processes and sources that are not controllable by agricultural management practices. Follow-up strategies to evaluate causes of pH and dissolved oxygen exceedances were implemented by the Coalition in the 2006 Irrigation Season. Sources of *E. coli* exceedances have been investigated through a region-wide pilot study conducted by the Coalition. The Coalition is currently working with the Water Board to develop a more comprehensive *E. coli* study. The Coalition also participates in the *ILRP* Technical Issues Committee (TIC) workgroups to develop procedures and guidelines for evaluation of exceedances. The TIC has worked with Water Board *ILRP* staff to develop recommendations incorporated into the revised *ILRP* Monitoring and Reporting Program requirements and procedures adopted by the Water Board in 2008 (*Order No. R5-2008-0005*).

The Coalition initiated some Phase 2 monitoring elements during the 2005 Irrigation Season, concurrent with the Phase 1 irrigation season monitoring, and has added and continued these elements for many of the current monitoring sites. The Phase 2 elements monitored include additional pesticide analyses, trace elements, and nutrients. The Coalition implemented a strategy of monitoring Phase 1 and Phase 2 constituents concurrently for new monitoring sites implemented in 2007.

The Coalition has implemented the required elements of the ILRP since 2004. The Coalition developed a WER which set the priorities for development and implementation of the MRPP. The Coalition successfully developed the MRPP and QAPP required by the *ILRP*, and these documents have been approved by the Water Board. Subsequent revisions requested by the Water Board have been incorporated into these documents and were implemented during the 2006 Irrigation Season monitoring, and continued for 2008 Coalition monitoring. The Coalition continues to adapt and improve elements of the monitoring program based on the knowledge gained through *ILRP* monitoring efforts.

The Coalition implemented the approved monitoring program in coordination with its subwatershed partners, and has initiated follow-up activities to address observed exceedances. The Coalition has also completed a Management Practice Action Plan (provided most recently in Appendix G of the *2007 Irrigation Season Semi-Annual Monitoring Report*) designed to communicate information and monitoring results within the Coalition, track implementation of management practices in the watershed, and evaluate effectiveness of management practices. Throughout this process, the Coalition has kept an open line of communication with the Water

Board and has made every effort to fulfill the requirements of the *ILRP* in a cost-effective and scientifically defensible manner. This semi-annual monitoring report is documentation of the success and continued progress of the Coalition in achieving these objectives.

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Introduction

The primary purpose of this report is to document the monitoring efforts and results of the Sacramento Valley Water Quality Coalition (Coalition) Monitoring and Reporting Program Plan (MRPP). This Irrigation Season Semi-Annual Monitoring Report also serves to document the Coalition's progress toward fulfilling the requirements of the *Conditional Waiver for Irrigated Lands* (hereinafter abbreviated as *ILRP* for *Irrigated Lands Regulatory Program*) and subsequent amendments to the *ILRP* requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833).

The Irrigation Season Semi-Annual Monitoring Report includes the following elements, as specified in the *ILRP*:

- A description of the watershed
- A summary of monitoring objectives
- Descriptions of sampling site locations and characteristics
- A summary of the sampling and analytical methods used
- All monitoring results, including field logs, photographs, laboratory reports, and chains-of-custody
- An evaluation of pesticide use information
- Interpretation of the monitoring results reported
- Evaluation of management practices in the Coalition watershed
- Actions taken to address exceedances observed in monitoring
- Conclusions and recommendations of the Irrigation Season Semi-Annual Monitoring Report

All report elements required by the *ILRP* or subsequently requested by the California Regional Water Quality Control Board, Central Valley Region (Water Board) are included in this report.

Description of the Watershed

The Sacramento River watershed drains over 27,000 square miles of land in the northern part of California's Central Valley into the Sacramento River. The upper watersheds of the Sacramento River region include the Pit River watershed above Lake Shasta and the Feather River above Lake Oroville. The Sacramento Valley drainages include the Colusa, Cache Creek, and Yolo Bypass watersheds on the west side of the valley, and the Feather, and American River watersheds on the east side of the valley. Additionally, the Coalition monitors in the Cosumnes River watershed, which is not part of the Sacramento River watershed. Beginning near the town of Red Bluff at its northern terminus, the Sacramento Valley stretches about 150 miles to the southeast where it merges into the Sacramento-San Joaquin River Delta south of the Sacramento metropolitan area. The valley is 30 to 45 miles wide in the southern to central parts but narrows to about 5 miles wide near Red Bluff. Its elevation decreases from 300 feet at its northern end to near sea level in the delta. The greater Sacramento River watershed includes sites from 5,000 feet in elevation to near sea level.

The Sacramento River Basin is a unique mosaic of farm lands, refuges, and managed wetlands for waterfowl habitat; spawning grounds for numerous salmon and steelhead trout; and the cities and rural communities that make up this region. This natural and working landscape between the crests of the Sierra Nevada and the Coast Range includes the following:

- More than a million acres of family farms that provide the economic engine for the region; provide a working landscape and pastoral setting; and serve as valuable habitat for waterfowl along the Pacific Flyway. The predominant crops include: rice, general grain and hay, improved pasture, corn, tomatoes, alfalfa, almonds, walnuts, prunes, safflower, and vineyards.
- Habitat for 50% of the threatened and endangered species in California, including the winter-run and spring-run salmon, steelhead, and many other fish species.
- Six National Wildlife Refuges, more than fifty state Wildlife Areas, and other privately managed wetlands that support the annual migration of waterfowl, geese, and water birds in the Pacific Flyway. These seasonal and permanent wetlands provide for 65% of the North American Waterfowl Management Plan objectives.
- The small towns and rural communities that form the backbone of the region, as well as the State Capital that serves as the center of government for the State of California.
- The forests and meadows in the numerous watersheds of the Sierra Nevada and Coast Range.

Monitoring Objectives

The Coalition's MRPP will achieve the following objectives as a condition of the *ILRP*:

1. Assess the impacts of waste discharges from irrigated lands to surface waters;
2. Determine the degree of implementation of management practices to reduce discharge of specific wastes that impact water quality;
3. Determine the effectiveness of management practices and strategies to reduce discharge of wastes that impact water quality;
4. Determine concentration and load of wastes in these discharges to surface waters; and
5. Evaluate compliance with existing narrative and/or numeric water quality objectives to determine if additional implementation of management practices is necessary to improve and/or protect water quality.

The Coalition is achieving these objectives by implementing a phased MRPP that initially evaluates samples for the presence of statistically significant toxicity of sufficient magnitude in the initial sample to trigger follow-up actions designed to identify constituents causing toxicity. Also, the Coalition is evaluating samples for violations of applicable numeric water quality objectives to trigger follow-up actions. Additionally, the Coalition is evaluating the degree of implementation of current management practices in priority watersheds and recommending additional practices as water quality results indicate a need to do so. The Coalition is committed to the principle of adaptive management to control specific discharges of waste that are having an impact on water quality. This iterative approach allows for the most effective use of scarce human and fiscal resources.

The parameters monitored by the Coalition to achieve these objectives are as specified in the *ILRP* and in subsequent amendments to the *ILRP* requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833). The following environmental monitoring elements are included in Phases 1-3 of the Coalition's MRPP:

- Water column and sediment toxicity
- Physical and conventional parameters in water and sediment
- Organic carbon and ultraviolet light absorbance in water
- Pathogen indicator organisms in water
- Trace metals in water and sediment
- Pesticides in water and sediment
- Nitrogen and phosphorus compounds in water

Note that not all parameters are monitored during every phase of monitoring. Specific individual parameters measured and the relevant Phases of the Coalition monitoring effort are listed in **Table 1**. Note that this list is consistent with the *ILRP* in effect when the Coalition 2008 monitoring program was implemented in 2008.

Table 1. Constituents to be Monitored for Phases 1–3 of Monitoring

Constituent	Quantitation Limit (in Water)	Reporting Unit	Monitoring Phases
Physical Parameters			
Flow	NA	CFS (Ft^3/Sec)	Phase 1, 2 & 3
pH	0.1 [(a)]	-log[H^+]	Phase 1, 2 & 3
Conductivity	0.1 [(a)]	μmhos/cm	Phase 1, 2 & 3
Dissolved Oxygen	0.1 [(a)]	mg/L	Phase 1, 2 & 3
Temperature	0.1 [(a)]	˚C	Phase 1, 2 & 3
Color	NA	Chloroplatinate Units (CU)	Phase 1, 2 & 3
Hardness, total as $CaCO_3$	10	mg/L	Phase 2
Turbidity	1.0	NTU	Phase 1, 2 & 3
Total Dissolved Solids	3.0	mg/L	Phase 1, 2 & 3
Total Suspended Solids	3.0	mg/L	Phase 1, 2 & 3
Total Organic Carbon	0.5	mg/L	Phase 1, 2 & 3
Pathogen Indicators			
E. Coli bacteria	2	MPN/100 mL	Phase 1
Water Column and Sediment Toxicity			
Ceriodaphnia, 96-h acute	NA	% Mortality	Phase 1
Pimephales, 96-h acute	NA	% Mortality	Phase 1
Selenastrum, 96-h short-term chronic	NA	Cell Growth	Phase 1
Hyalella, 10-day short-term chronic	NA	% Mortality	Phase 1
Pesticides			
Carbamates	(b)	ug/L	Phase 2 [(c)]
Organochlorines	(b)	ug/L	Phase 2 [(c)]
Organophosphorus	(b)	ug/L	Phase 2 [(c)]
Pyrethroids	(b)	ug/L	Phase 2 [(c)]
Herbicides	(b)	ug/L	Phase 2 [(c)]
Trace Elements			
Arsenic	0.5	ug/L	Phase 2 [(c)]
Boron	10	ug/L	Phase 2 [(c)]
Cadmium	0.1	ug/L	Phase 2 [(c)]
Copper	0.5	ug/L	Phase 2 [(c)]
Lead	0.25	ug/L	Phase 2 [(c)]
Nickel	0.5	ug/L	Phase 2 [(c)]
Selenium	1.0	ug/L	Phase 2 [(c)]
Zinc	1.0	ug/L	Phase 2 [(c)]
Nutrients			
Total Kjeldahl Nitrogen	0.1	mg/L	Phase 2 [(c)]
Phosphorus, total	0.1	mg/L	Phase 2 [(c)]
Soluble Orthophosphate	0.01	mg/L	Phase 2 [(c)]
Nitrate as N	0.1	mg/L	Phase 2 [(c)]
Nitrite as N	0.03	mg/L	Phase 2 [(c)]
Ammonia as N	0.1	mg/L	Phase 2 [(c)]

(a) Detection and reporting limits are not strictly defined. Tabled value indicates required reporting precision.
(b) Limits are different for individual pesticides.
(c) Phase 2 monitoring may be conducted concurrently with Phase 1. Pesticides, trace elements, or nutrients suspected of causing toxicity or of causing exceedances of relevant water quality objectives may continue to be monitored in Phase 3.

Sampling Site Descriptions

To successfully implement the monitoring and reporting program requirements contained in the *ILRP* adopted by the Water Board in June 2003, the Coalition worked directly with landowners in the twenty-one county watershed to identify and develop ten subwatershed groups. Representatives from each subwatershed group utilized agronomic and hydrologic data generated by the Coalition in an attempt to prioritize watershed areas for initial evaluation to ultimately select monitoring sites in their respective areas based upon existing infrastructure, historical monitoring data, land-use patterns, historical pesticide use, and the presence of 303(d)-listed water bodies.

Coalition members selected sampling sites in priority watersheds based upon the following fundamental assumptions regarding management of non-point source discharges to surface water bodies: 1) Landscape scale sampling at the bottom of drainage areas allows for determinations regarding the presence of a water quality problems using a variety of analytical methods including water column and sediment toxicity testing as well water chemistry analyses and bioassessment; 2) Strategic source investigations utilizing Geographic Information Systems can be used to identify upstream parcels with attributes that may be related to the analytical results, including crops, pesticide applications, and soil type; and 3) Though recognizably complex, management practice effectiveness can best be assessed by coalitions at the watershed scale to determine compliance with water quality objectives in designated water bodies. Results from farm-level management practices evaluations will be used to complement Coalition efforts on the watershed scale by providing crop-specific information that will support management practice recommendations.

In January 2007, the Coalition adopted a more aggressive monitoring approach that involved, in part, replacing previously monitored sites with high priority sites in intermediate size drainages. Thirteen new monitoring locations in unmonitored drainages replaced sites monitored in 2006 with completed Phase 2 monitoring. Candidate drainages for new monitoring locations were selected based on overall monitoring priorities and an increased focus on maximizing the number of intermediate size drainages in 2007 to meet the requirements of the R5-2005-0833 MRP. The basis for making these monitoring recommendations for sites monitored in 2006 was provided in the Coalition's 2007 Monitoring Plan. Under the Coalition's long-term monitoring strategy outlined in 2006 and implemented in 2007, there would have been substantial changes included in the sites monitored for 2008. However, due to the significant changes expected in monitoring requirements for the revised ILRP MRP adopted in January 2008, the Monitoring Plan for 2008 was largely a continuation of the monitoring planned and conducted in 2007. Because the Coalition selected high priority drainages for its initial monitoring efforts, the monitoring conducted through 2008 provide a solid foundation of data to characterize agricultural waters in the watershed.

SAMPLING SITE LOCATIONS AND LAND USES

The sites monitored by the Coalition in 2008 are listed in **Table 2**. All sites monitored in 2008 have been approved by the Water Board as *ILRP* compliance sites. An overall map of Coalition and subwatershed sites is presented in **Figure 1**. Site-specific drainage maps with land use patterns for all monitoring locations are also provided in **Appendix F**.

Table 2. Coalition Monitoring Sites, 2008

Subwatershed	Site Name	Latitude	Longitude	Implementing Agency	Site ID (Fig. 1)
ButteYubaSutter	Sacramento Slough Bridge near Karnak	38.7850	-121.6533	SVWQC/CRC	SSKNK
	Grasshopper Slough at Forty Mile Road	38.9938	-121.4898	SVWQC	GRHPR
	Lower Snake R. at Nuestro Rd	39.1853	-121.7036	SVWQC	LSNKR
ColusaBasin	Colusa Basin Drain above KL	38.8125	-121.7731	SVWQC/CRC	COLDR
	Freshwater Creek at Gibson Rd	39.1766	-122.1892	SVWQC	FRSHC
	Logan Creek at 4 Mile-Excelsior Rd	39.3653	-122.1161	SVWQC	LGNCR
	Lurline Creek at 99W	39.2122	-122.1833	SVWQC	LRLNC
	Walker Creek at Co Rd 48	39.5388	-122.1762	SVWQC	WLKRC
ElDorado	Coon Hollow Creek	38.7534	-120.7240	SVWQC	COONH
LakeNapa	Pope Creek upstream from Lake Berryessa	38.6464	-122.3642	PCWG	PCULB
	Capell Creek u/s from Lake Berryessa	38.4825	-122.2411	PCWG	CCULB
	Middle Creek u/s from Highway 20	39.1635	-122.9161	SVWQC	MDLCR
PitRiver	Pit River at Pittville	41.0454	-121.3317	NECWA	PRPIT
	Fall River at Fall River Ranch Bridge	41.0351	-121.4864	NECWA	FRRRB
	Pit River at Canby Bridge	41.4017	-120.9310	NECWA	PRCAN
PNSSNS	Coon Creek at Brewer Road	38.9340	-121.4518	SVWQC	CCBRW
SacramentoAmador	Laguna Creek at Alta Mesa Road	38.3110	-121.2263	SVWQC	LAGAM
	Grand Island Drain near Leary Road	38.2399	-121.5649	SVWQC	GIDLR
ShastaTehama	Coyote Creek at Tyler Road	40.0926	-122.1590	SVWQC	COYTR
SolanoYolo	Willow Slough Bypass at Pole Line	38.5902	-121.7306	SVWQC	WLSPL
	Cache Cr. at Diversion Dam	38.7137	-122.0851	SVWQC	CCCPY
	Shag Slough at Liberty Island Bridge	38.3068	-121.6934	SVWQC	SSLIB
	Ulatis Creek at Brown Road	38.3070	-121.7940	SVWQC	UCBRD
UpperFeatherRiver	Middle Fork Feather River above Grizzly Cr.	39.8160	-120.4260	UFRW	MFFGR
	Indian Creek at Arlington Bridge	40.0846	-120.9161	UFRW	INDAB
	Spanish Creek below Greenhorn Creek	39.9735	-120.9103	UFRW	SPNGR

Table 3. Modifications for Continued Monitoring in 2008 at Sites Monitored in 2007

Subwatershed	Site	2008 Action and Rationale
ButteYubaSutter	Gilsizer Slough at George Washington Road	Continue with selected analytes to support evaluation of parameters of concern and management effectiveness. **No monitoring conducted during 2008 irrigation season.**
ButteYubaSutter	Pine Creek at Nord Gianella Road	Continue with selected analytes to support documentation of management practice effectiveness. **Monitoring conducted only during storm season.**
Sacramento-Amador	Dry Creek at Alta Mesa Road	These sites were discontinued as regularly scheduled monitoring sites in 2008. Each site may continue to be monitored for specific parameters according to the schedule required by Management Plans currently under development. **No monitoring was conducted during 2008 irrigation season at these sites.**
Shasta-Tehama	Anderson Creek at Ash Creek Road	
Colusa-Glenn	Stony Creek on Hwy 45	
El Dorado	Coon Hollow Creek	COONH was discontinued from regular scheduled monitoring as of July 2008 and replaced with North Canyon Creek.
El Dorado	North Canyon Creek	With approval of the Regional Water Board, this site was reinstated in July 2008 as a replacement for COONH.

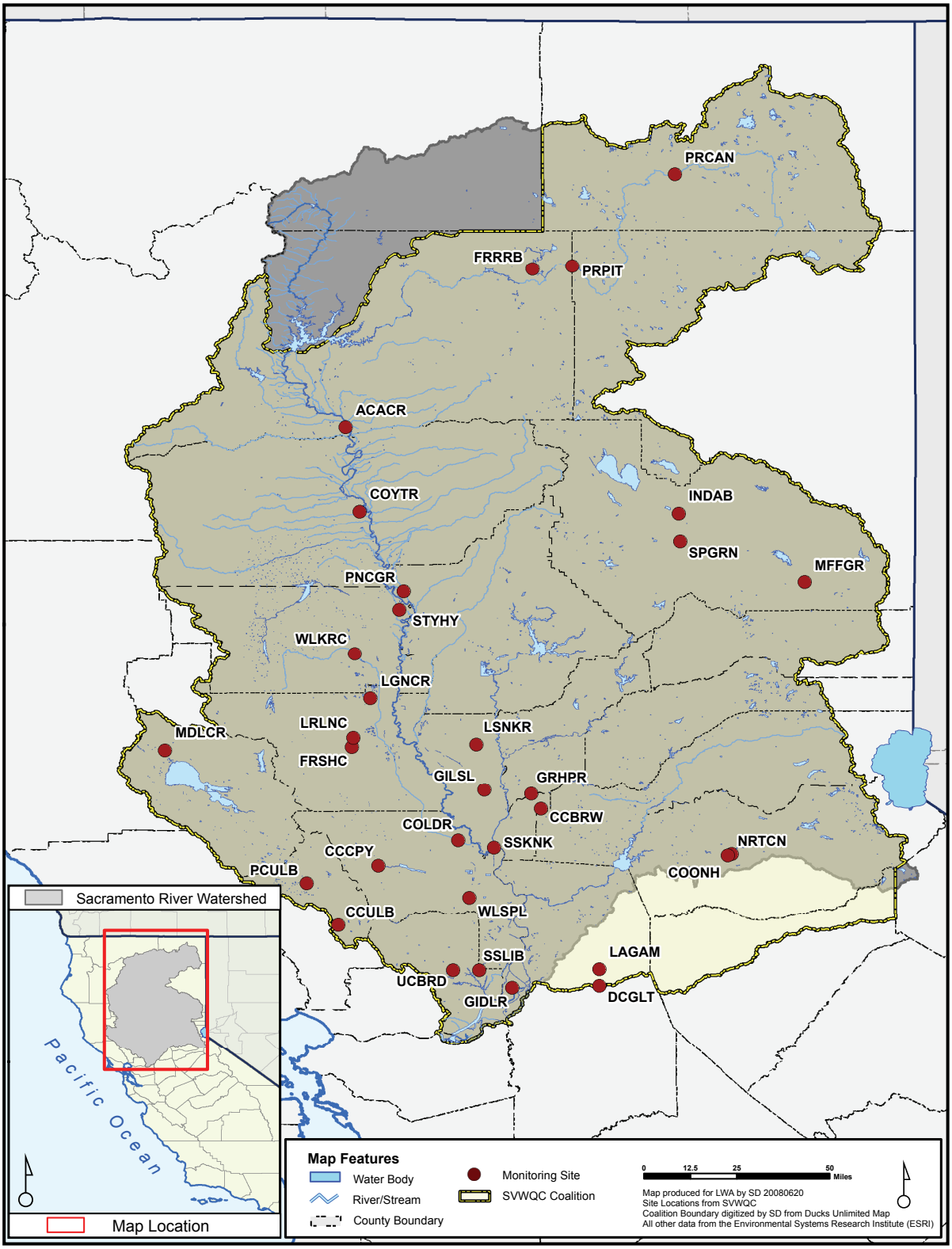

Figure 1. Coalition Monitoring Sites

SITE DESCRIPTIONS

Butte/Yuba/Sutter Subwatershed

Pine Creek at Nord-Gianella Road (PNCGR)

The watershed sampled upstream from the monitoring site represents approximately 13,440 acres of varied farmland, riparian habitat and farmsteads. The predominant crops in this area are walnuts, almonds, prunes, wheat, oats, barley, beans, squash, cucumbers, alfalfa, pasture, and safflower.

Sacramento Slough Bridge near Karnak (SSKNK)

This site aggregates water from all areas in the subwatershed between the Feather and Sacramento Rivers. The major contributing areas include the areas downstream of the Butte Slough and Wadsworth monitoring sites. These areas include Sutter Bypass and its major inputs from Gilsizer Slough, RD 1660, RD 1500, and the Lower Snake River. Monitoring at this site is coordinated with the California Rice Commission.

Gilsizer Slough at George Washington Road (GILSL)

Gilsizer Slough is an unlined storm drainage outfall canal that runs from the Gilsizer County Drainage District's north pump station approximately 15 miles to the Sutter Bypass, draining 6,005 total acres. The actual monitoring location is located roughly 1.5 drainage miles from its confluence with the Sutter bypass and is a natural drainage channel that historically has drained Yuba City and the area south of town. Principal crops grown in this area include prunes, walnuts, peaches, and almonds.

Grasshopper Slough at Forty Mile Road (GRHPR)

Grasshopper Slough is a small drainage about 4 miles west of Wheatland. It drains about 47,000 total acres. Predominant crops in this drainage include walnuts, rice, pasture, almonds, and prunes.

Lower Snake River at Nuestro Road (LSNKR)

The Lower Snake River is an unlined irrigation supply and runoff canal that serves approximately 25,000 total acres and includes a relatively high percentage of rice acreage. The other predominant crops include prunes, peaches, idle acreage, and operations producing flowers, nursery stock, and Christmas trees.

Colusa Glenn Subwatershed

Stony Creek at Hwy 45 (near Rd. 24) (STYHY)

This site characterizes water from the contributing area downstream of Black Butte Reservoir just north of the town of Orland and includes approximately 20,000 acres of irrigated lands. The major irrigated crops in the Lower Stony Creek drainage are pasture, almonds, prunes, and wheat.

Colusa Basin Drain above Knights Landing (COLDR)

This site is near the outfall gates of the Colusa Basin Drain before its confluence with the Sacramento River. This site is downstream of all of the other monitoring sites within the basin. The upstream acreage consists of almonds, tomatoes, wetlands, pasture, corn, and walnuts. Monitoring at this site is coordinated with the California Rice Commission.

Freshwater Creek at Gibson Road (FRSHC)

The Freshwater Creek drainage includes approximately 83,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, tomatoes, idle, squash, grain, pasture, and safflower.

Logan Creek at 4 Mile-Excelsior Road (LGNCR)

The Logan Creek drainage includes approximately 98,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 28,000 acres. Predominant crops in the drainage are rice, grain, corn, pasture, and managed marshland.

Lurline Creek at 99W (LRLNC)

The Lurline Creek drainage includes approximately 55,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, idle acreage, pasture, managed wetland, grain, melons, and squash.

Walker Creek at County Road 48 (WLKRC)

The Walker Creek drainage is located east of Wilson Creek in Glenn County, and the Walker Creek monitoring site is located 1.3 miles north of the Town of Willows. The Walker Creek drainage includes approximately 27,000 total irrigated acres. Predominant crops in this drainage are almonds, rice, corn, and alfalfa.

El Dorado County Subwatershed

North Canyon Creek (NRTCN)

This site captures representative agricultural drainage from the Camino-"Apple Hill" drainage in El Dorado County. Crops grown in this region include apples, pears, wine grapes, stone fruit, and Christmas trees. This site is approximately one (1) mile upstream from the confluence with the South Fork American River and is a perennial stream.

Coon Hollow Creek (COONH)

This site is located in the Apple Hill area of Camino, approximately 1 mile north of the intersection of North Canyon Road and Carson Road and 1/2 mile south of the confluence with South Canyon Creek. Agricultural operations within the drainage include apples, wine grapes, cherries, and blueberries. Coon Hollow Creek is considered a low-flow perennial stream.

Lake/Napa Subwatershed

Pope Creek and Capell Creek (PCULB and CCULB)

The sites on Pope Creek and Capell Creek in Napa County are downstream of major storm runoff but are above the level of the receiving waters of Lake Berryessa. Collectively, these sites capture drainage from approximately 3,400 acres of irrigated lands. Primary crops include vineyards and olive orchards. Based upon the ephemeral nature of these two Napa County creeks, samples are planned to be collected three times per year: in January, March, and May.

Middle Creek Upstream from Highway 20 (MDLCR)

The Middle Creek drainage contains approximately 60,732 acres. Over 55,000 acres are listed as Native Vegetation with the US Forest Service controlling the majority of the land. Irrigated agriculture constitutes approx 1,112 acres participating in the Lake County Watershed group. This includes 374 acres of walnuts, 308 acres of grapes, 186 acres of pears 159 acres of hay/pasture, 10 acres of specialty crops/nursery crops and about 70 acres of wild rice.

The sampling location was chosen to avoid influence for the town of Upper Lake, and captures approximately 60% of irrigated agricultural operations within this drainage. Due to the ephemeral nature of the creek, sampling at this site is planned to be conducted three times per year: twice during the storm season, and once after commencement of the irrigation season.

Pit River Subwatershed

Pit River at Pittville Bridge (PRPIT)

This site captures drainage from Big Valley, Ash Creek and Horse Creek. This site captures drainage from the primary land-use, native pasture, as well as alfalfa, oat hay, grain and duck marsh, ultimately incorporating approximately 9,000 acres in the Fall River Valley.

Fall River at Fall River Ranch Bridge (FRRRB)

This site is located at the lower end of Fall River before the river is partially diverted for hydroelectric uses at the Pit 1 Power House. The majority of Fall River water is spring-fed water that emerges in the northern portions of the valley (e.g., Lava Creek Springs, Spring Creek Springs, Crystal Springs, Mallard Springs, Big Lake Springs, Thousand Springs, Hideaway Spring, Rainbow Spring). These springs form the Little Tule River, Tule River, Spring Creek, Lava Creek, Mallard Creek, and Ja She Creek. One major tributary to Fall River, Bear Creek, captures flow mostly from private timberland comprising approximately 27 square miles of watershed. Bear Creek joins the Fall River near Thousand Springs. Finally, small amounts of water enter the Fall River from overland flow during winter and from irrigated lands during the growing season. Pasture, wild rice, and alfalfa are the primary agriculture crops in the northern portion of the valley. Total irrigated acreage draining to this site is approximately 12,000 acres.

Pit River at Canby (PRCAN)

This site captures drainage from the Alturas and Canby drainage areas, as well as drainage from the North and South Fork of Pit River and Hot Springs Valley. Land-uses are primarily pasture and grain and hay crops. Approximate irrigated acreage is 50,000.

Placer/Nevada/South Sutter/North Sacramento Subwatershed

Coon Creek at Brewer Road (CCBRW)

This site captures drainage from the Middle Coon Creek drainage areas as identified in the Placer-Northern Sacramento Drainage Prioritization Table in the Coalition's Watershed Evaluation Report (WER). This site is on Coon Creek about six miles northwest of the town of Lincoln and includes predominantly agricultural acreage. The drainage includes approximately 65,000 irrigated acres of rice, rice, pasture, grains, and sudan grass, with a high percentage of rice acreage.

Sacramento/Amador Subwatershed

Dry Creek at Alta Mesa Road (DCGLT)

Dry Creek originates in the eastern foothills and flows through considerable agricultural acreage. The drainage includes the southern portion of Amador County, the southeast corner of Sacramento County and the northeast corner of San Joaquin County. Amador County agriculture includes grain and irrigated pasture in the Dry Creek Valley and row crops, irrigated pasture, grain, vineyard, and orchard in the Jackson Valley. Sacramento County agriculture includes vineyard, irrigated pasture, grain, and scattered dairies. Dry Creek drains approximately 329 square miles (n.b. the number of irrigated acres is still being determined).

Laguna Creek at Alta Mesa Road (LAGAM)

Laguna Creek is a tributary to the Cosumnes River. Laguna Creek originates in Amador County and flows south-west into Sacramento County, draining Willow, Hadselville, Brown and Griffith Creeks, among others. The primary agricultural uses are vineyards, field crops, grain and hay crops and pasture.

Grand Island Drain near Leary Road (GIDLR)

Grand Island is located in the heart of the Sacramento Delta. Crops include alfalfa, corn, safflower, apples, pears, cherries, blueberries, asparagus, grapes, and pasture land. Water is pumped on to the island at several locations. The monitoring site is located just up-slough from a station that returns water to the Delta. Approximately 8,000 acres drains to the monitoring site.

Shasta/Tehama Subwatershed

Anderson Creek at Ash Creek Road (ACACR)

Anderson Creek was identified as the highest priority drainage in the Shasta county portion of the Shasta/Tehama subwatershed. This ranking was based on total irrigated acreage, crop types by acreage, and amount and type of pesticide use. Anderson Creek originates about three miles west of the city of Anderson and then flows into the Sacramento River. Crops are predominantly pasture, followed by walnuts and alfalfa/hay and then smaller amounts of other field and orchard crops. Total irrigated land is 8,989 acres.

Coyote Creek at Tyler Road (COYTR)

The Coyote Creek drainage includes approximately 37,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 6,700 acres. Predominant crops in the drainage are pasture, walnuts, prunes, almonds, and olives.

Solano/Yolo Subwatershed

Willow Slough Bypass at Pole Line Road (WLSPL)

The Willow Slough is a large drainage including approximately 102,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 66,000 acres. Predominant crops in the drainage are grain, pasture, corn, tomatoes, rice, and walnuts.

Cache Creek at Diversion Dam (CCCPY)

The diversion dam on Cache Creek near Capay is the main diversion point for irrigation water in the 190,000 acre Yolo County Flood Control and Water Conservation District. The Diversion Dam is located 1.9 miles west of the town of Capay. During the summer irrigation season, the water at this site is released from storage approximately 50-60 miles upstream, from the Clear Lake and Indian Valley Reservoirs. There is no snow pack in this coastal watershed, therefore winter flows are very flashy (rising and falling quickly). Major crops in this drainage include tomatoes, alfalfa, corn, wheat, grapes, and orchards.

Shag Slough at Liberty Island Bridge (SSLIB)

Due to the access difficulties, Toe Drain was replaced with Shag Slough in late 2005. Shag Slough drains a large portion of the South Yolo Bypass. Crops grown in this drainage area include corn, safflower, grain, vineyards, tomatoes, and irrigated pasture. The Liberty Island Bridge site is approximately 2.5 to 3 miles southwest of the Toe Drain in Shag Slough. Like the Toe Drain, it is a tidally influenced site and is likely to contain a mixture of Toe Drain water along with water from other sub-drainages within the South Yolo Bypass and the Southwest Yolo Bypass.

Ulatis Creek at Brown Road (UCBRD)

Ulatis Creek is a flood control project (FCP) that drains the majority of the central portion of Solano County. The Ulatis Creek FCP monitoring site is approximately 8.5 miles south of Dixon and 1.5 miles east of State Highway 113 on Brown Road. This site drains the Cache Slough area, as designated in the Yolo/Solano subwatershed map, and empties into Cache Slough. The major crops in this area include wheat, corn, pasture, tomatoes, alfalfa, Sudan grass, walnuts and almonds.

Upper Feather River Watershed

Agriculture in this subwatershed is localized in mountain valleys that are suitable for grazing and growing alfalfa and grain hay crops. Monitoring in this subwatershed is therefore focused on characterizing drainage from three valleys with considerable agricultural acreage.

Middle Fork Feather River above Grizzly Creek (MFFRG)

The Middle Fork above Grizzly Creek is below the last irrigated site in the Sierra Valley sub-watershed and has year-round flow in most years. This site replaces Middle Fork Feather River at County Rd A-23, which lacks year-round flow (often dry by mid-July) and has numerous non-agricultural uses, including recreation and water trucks.

Indian Creek at Arlington Bridge (INDAB)

This site replaced Indian Creek downstream from Indian Valley. This site is located at the edge of the irrigated agriculture in the Indian Creek Watershed. Indian Creek drains the second largest irrigated agricultural region in this subwatershed, the Indian Valley. There are approximately 12,500 acres of native pasture, hay, and alfalfa. Drainage flows through the Indian Valley via Wolf Creek, Cooks Creek, Lights Creek and Indian Creek. The first three creeks ultimately flow to the southwest and join Indian Creek on the west side of the valley upstream from the monitoring site. This site provides a baseline for potential upstream monitoring on these tributary streams if necessary.

Spanish Creek below Greenhorn Creek Confluence (SPGRN)

This site replaced Spanish Creek above the confluence with Greenhorn Creek. This site captures drainage from both Greenhorn and Spanish Creeks in the American Valley, which encompasses approximately 1,800 irrigated acres of pasture. Spanish Creek and Greenhorn Creek are the two primary streams draining the valley. A third stream, Mill Creek, connects with Spanish Creek upstream of the monitoring point. These creeks generally flow in a northerly direction, and ultimately, Spanish Creek connects with the North Fork Feather River.

Sampling and Analytical Methods

The objective of data collection for this monitoring program is to produce data that represent, as closely as possible, *in situ* conditions of agricultural discharges and water bodies in the Central Valley. This objective will be achieved by using standard accepted methods to collect and analyze surface water and sediment samples. Assessing the monitoring program's ability to meet this objective will be accomplished by evaluating the resulting laboratory measurements in terms of detection limits, precision, accuracy, representativeness, comparability, and completeness, as described in the Coalition's QAPP (SVWQC 2006) and approved by the Water Board.

Surface water samples were collected for analysis of the constituents listed in **Table 1** as specified in the Coalition's Monitoring Plans. Surface water and sediment samples were collected for chemical analyses and toxicity testing. All samples were collected and analyzed using the methods specified in the QAPP; any deviations from these methods were explained.

SAMPLE COLLECTION METHODS

All samples were collected in a manner appropriate for the specific analytical methods used and to ensure that water column samples were representative of the flow in the channel cross-section. Water quality samples were collected using clean techniques that minimize sample contamination. Samples were cross-sectional composite samples or mid-stream, mid-depth grab samples, depending on sampling site and event characteristics. Where appropriate, water samples were collected using a standard multi-vertical depth integrating method. Abbreviated sampling methods (i.e., weighted-bottle or dip sample) may be used for collecting representative water samples. If grab sample collection methods were used, samples were taken at approximately mid-stream and mid-depth at the location of greatest flow (where feasible).

Sediment sampling was conducted on an approximately 50 meter reach of the waterbody near the same location as water quality sampling stations. The specific reach definitions vary based on conditions at each sampling station. Sediment sub-samples were collected from five to ten wadeable depositional zones. Depositional zones include areas on the inside bend of a stream or areas downstream from obstacles such as boulders, islands, sand bars, or simply shallow waters near the shore. In low-energy waterbodies, composite samples may be collected from the bottom of the channel using appropriate equipment, as specified in the Coalition's QAPP. Sediment samples for toxicity analyses were collected in such a manner to minimize air above sediment and to prevent exposure to air.

Details of the standard operating procedures (SOPs) for collection of surface water and sediment samples are provided in Appendix C of the Coalition's QAPP.

The SVWQC monitoring program was initially implemented using the three-phased approach specified in the *ILRP* MRP and the Coalition's MRPP. Phase 1 monitoring includes analyses of physical parameters, drinking water constituents, and toxicity testing. Phase 2 monitoring includes chemical analyses of pesticides, metals, inorganic constituents and nutrients as well as continued monitoring of some required Phase 1 parameters, plus specific constituents that are identified as causes of toxicity testing in Phase 1. Phase 3 monitoring will include management practice effectiveness and implementation tracking and may include monitoring of additional water quality sites in the upper portions of the watershed. The initiation, scope, and schedule of Phase 2 and Phase 3 monitoring are intended to be dependent on the results of Phase 1

monitoring, as described in the MRPP. Some elements of Phase 2 monitoring have been conducted concurrently with Phase 1 monitoring. The sites and annual frequency of samples planned to be collected for the Coalition's 2008 monitoring are summarized in **Table 4**.

The Coalition's long term monitoring strategy was designed to achieve overall characterization of high and medium priority drainages in 5 years. The Coalition's monitoring plan for 2007 also anticipated some changes in monitoring requirements in the revised MRP that was expected to be released by the Regional Board in 2006, and was delayed until January 2008. These changes in the *ILRP* MRP were expected to include an end to the phased monitoring approach of the current MRP, and replacement of the poorly defined requirement for 20% additional intermediate drainages per year with a more general requirement for a long term monitoring strategy to characterize agricultural drainages. Revisions in the adopted ILRP MRP (*Monitoring and Reporting Program Order No. R5-2008-0005*) included numerous technical changes in monitoring requirements, and implemented significant additional changes in the overall monitoring strategy.

The elements that are key to achieving the Coalition's goals and satisfying the intent of the requirements of the R5-2005-0833 MRP currently in effect are (1) the Coalition's prioritization process for selecting drainages and monitoring sites, and (2) an efficient strategy for implementing monitoring in intermediate drainages. The overall strategy for efficiently completing the required monitoring has been to focus selectively on unmonitored intermediate drainages that are rated high or medium priority based on their irrigated acreage, cropping patterns, pesticide use, and their potential for contributing to cumulative impacts on receiving waters. Generally, this objective was being achieved by replacing sites with completed monitoring with new sites in intermediate drainages, as was done in 2007. Additionally, the Coalition continued to monitor several integrator sites that characterize multiple smaller drainages and provide an assessment of the overall or cumulative quality of irrigated agriculture runoff. Examples of these integrator sites are Colusa Basin Drain near Knights Landing and Shag Slough at Liberty Island Bridge. No significant changes to this strategy were implemented in 2008.

The other aspect of efficiently completing the required monitoring is to concurrently analyze all parameters required for Phase 1 and Phase 2 of the current R5-2005-0833 MRP. This allows drainages to be characterized in a single year instead in the two years required under the phased approach. All new sites implemented for 2007 were monitored for the full suite of parameters required for the MRP, as appropriate for the cropping and pesticide use patterns in each drainage. For continuing sites, a reduced set of parameters may be monitored based on previous monitoring results, with the goal of completing the Phase 2 monitoring for these sites. In cases where continued monitoring is required to evaluate effectiveness of management plans, the frequency and locations of monitoring will be established in the specific management plan and will be focused on the parameters of concern.

Table 4. Coalition 2008 Monitoring: Planned Annual Sampling Frequency

		Physical, Chemical, and Microbiological										Toxicity					
Subwatershed	**Location**	pH, conductivity, DO, temperature, flow	Turbidity, TDS, TSS, TOC	Nutrients	Trace Metals	Organophosphate pesticides	Triazines	Organonochlorines	Carbamate and Urea Pesticides	Glyphosate and Paraquat	Pathogen Indicators: E. Coli	Ceriodaphnia, 96-h acute	Pimephales, 96-h acute	Selenastrum, 96-h short-term chronic	Hyalella, 10-day short-term chronic	Pyrethroids in toxic sediments	Implementation
ButteYubaSutter	Grasshopper Sl. at Forty Mile Rd[2]	2	2	2	2	2	2	2	2	2	2	2	2	2	ns	ns	SVWQC
	Lower Snake R. at Nuestro Rd	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Sacramento Sl. Br. near Karnak	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC/CRC
Colusa Basin	Freshwater Creek at Gibson Rd	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Logan Cr. at 4 Mile-Excelsior Rd	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Lurline Creek at 99W	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Walker Creek at Co Rd 48	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Colusa Drain above KL	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC/CRC
El Dorado	Coon Hollow Creek[1] *(NRTCN after 7/08)*	8	8	8	8	mp	mp	mp	mp	ns	8	8	8	8	2	2	SVWQC
LakeNapa	Middle Creek u/s Hwy 20[1]	3	3	3	3	3	3	3	ns	3	3	3	3	3	2	2	SVWQC
	Pope Cr u/s from L. Berryessa[1]	3	3	ns	ns	ns	ns	ns	ns	ns	3	ns	ns	ns	ns	ns	PCWG
	Capell Cr u/s from L. Berryessa[1]	3	3	ns	ns	ns	ns	ns	ns	ns	3	ns	ns	ns	ns	ns	PCWG
Pit River	Pit River at Pittville[1]	8	8	8	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	ns	NECWA
	Fall R. at Fall R. Ranch Bridge[1]	8	8	8	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	ns	NECWA
	Pit River at Canby Bridge[1]	8	8	8	ns	ns	ns	ns	ns	ns	8	ns	ns	ns	ns	ns	NECWA
PNSNSS	Coon Creek at Brewer Rd	8	8	8	8	8	8	8	8	ns	8	8	8	8	2	2	SVWQC
SacAmador	Laguna Creek at Alta Mesa Rd	8	8	8	8	8	8	8	8	ns	8	8	8	8	2	2	SVWQC
	Grand Island Drain nr Leary Rd	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
ShastaTehama	Coyote Creek at Tyler Rd[1]	8	8	8	8	8	ns	ns	8	ns	8	8	8	8	2	2	SVWQC
SolanoYolo	Willow Sl. Bypass at Pole Line	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Cache Cr. at Diversion Dam	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Ulatis Creek at Brown Road	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
	Shag Sl. at Liberty Island Bridge	8	8	8	8	8	8	8	8	8	8	8	8	8	2	2	SVWQC
Upper Feather	Spanish Cr. below Greenhorn Cr[1]	7	7	7	ns	ns	ns	ns	ns	ns	7	ns	ns	ns	ns	ns	UFRW
	Indian Creek at Arlington Bridge[1]	7	7	7	ns	ns	ns	ns	ns	ns	7	ns	ns	ns	ns	ns	UFRW
	Middle Fk Feather R. above Grizzly Cr. [1]	7	7	7	ns	ns	ns	ns	ns	ns	7	ns	ns	ns	ns	ns	UFRW

Notes:

Tabled values indicate number of regular analyses planned for 2008.

"*ns*" indicates parameters are not sampled.

"*mp*" indicates specific parameters and frequency established in a Management Plan.

Implementation indicates whether monitoring is conducted by the Coalition (SVWQC), Northeastern California Water Association (NECWA), Napa County Putah Creek Watershed Group (PCWG), Upper Feather River Watershed Prop 50 Project Team (UFRW), or in coordination with California Rice Commission (CRC).

1. Subset of MRP parameters are monitored based on agricultural and pesticide use patterns in watershed.
2. An alternate site for Grasshopper Slough was evaluated and selected, and was subsequently rejected late in the Irrigation Season because the crops in the drainage were predominantly rice. Grasshopper Slough was monitored but has been found to be dry under all sampling conditions encountered to date.

ANALYTICAL METHODS

Water chemistry samples were analyzed for filtered (dissolved) and unfiltered/whole (total) fractions of the samples. Pesticide analyses were conducted only on unfiltered (whole) samples. Laboratories analyzing samples for this program have demonstrated the ability to meet the minimum performance requirements for each analytical method, including the ability to meet the project-specified quantitation limits (QL), the ability to generate acceptable precision and recoveries, and other analytical and quality control parameters documented in the Coalition's QAPP. Analytical methods used for chemical analyses follow accepted standard methods or approved modifications of these methods, and all procedures for analyses are documented in the QAPP or available for review and approval at each laboratory.

Toxicity Testing and Toxicity Identification Evaluations

Water quality samples were analyzed for toxicity to *Ceriodaphnia dubia*, *Pimephales promelas*, and *Selenastrum capricornutum*. Sediment samples were analyzed for toxicity to *Hyalella azteca*. Toxicity tests were conducted using standard USEPA methods for these species.

- Determination of acute toxicity to *Ceriodaphnia* and *Pimephales* was performed as described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition* (USEPA 2002a). Toxicity tests with *Ceriodaphnia* and *Pimephales* were conducted as 96-hour static renewal tests, with renewal 48 hours after test initiation. If found to be necessary to control pathogen-related mortality for acute tests with *Pimephales*, test procedures may be modified as described in Geis *et al*. (2003). These modifications consist of using smaller test containers (30 mL), including only two fish per container, and increasing the number of replicates to ten.
- Determination of toxicity to *Selenastrum* was performed using the non-EDTA procedure described in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition* (USEPA 2002b). Toxicity tests with *Selenastrum* are conducted as a 96-hour static non-renewal test.
- Determination of sediment toxicity to *Hyalella* was performed as described in *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates–Second Edition* (USEPA 2000). Toxicity tests with *Hyalella* were conducted as a 10-day whole-sediment toxicity test with renewal of overlying water at 12 hour intervals.

For all initial screening toxicity tests at each site, 100% ambient water and a control will be used for the acute water column tests. If 100% mortality to a test species is observed any time after the initiation of the initial screening toxicity test, a multiple dilution test using a minimum of five sample dilutions will be conducted with the initial water sample to estimate the magnitude of toxicity.

Procedures in the currently effective QAPP state that if any measurement endpoint from any of the three aquatic toxicity tests exhibits a significantly significant difference from the control of greater than 50%, Toxicity Identification Evaluation (TIE) procedures will be initiated using the most sensitive species to investigate the cause of toxicity. The 50% mortality threshold is

consistent with the approach recommended in guidance published by USEPA for conducting TIEs (USEPA 1996b), which recommends a minimum threshold of 50% mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity. For samples that met these trigger criteria, Phase 1 TIEs to determine the general class of constituent (*e.g.*, metal, non-polar organics) causing toxicity or pesticide-focused TIEs were conducted. TIE methods generally adhere to the documented USEPA procedures referenced in the QAPP. TIE procedures were initiated as soon as possible after toxicity is observed to reduce the potential for loss of toxicity due to extended sample storage. Procedures for initiating and conducting TIEs are documented in the QAPP (SVWQC 2006).

Detection and Quantitation Limits

The Method Detection Limit (MDL) is the minimum analyte concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. The Quantitation Limit (QL) represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and confidence in both identification and quantitation. For this program, QLs were established based on the verifiable levels and general measurement capabilities demonstrated by labs for each method. These QLs are considered to be maximum allowable limits to be used for laboratory data reporting. Note that samples required to be diluted for analysis (or corrected for percent moisture for sediment samples) may have sample-specific QLs that exceed the established QLs. This is unavoidable in some cases.

Project Quantitation Limits

Laboratories generally establish QLs that are reported with the analytical results—these may be called *reporting limits*, *detection limits*, *reporting detection limits*, or several other terms by different laboratories. In most cases, these laboratory limits are less than or equal to the project QLs listed in **Table 5**. Wherever possible, project QLs are lower than the proposed or existing relevant numeric water quality objectives or toxicity thresholds, as required by the *ILRP*.

All analytical results between the MDL and QL are reported as numerical values and qualified as estimates ("J-values").

Table 5. Laboratory Method Detection Limit (MDL) and Quantitation Limit (QL) Requirements for Analyses of Surface Water for SVWQC Monitoring and Reporting Program Plan

Method	Analyte	Fraction	Units	MDL	QL	LAB
Physical and conventional Parameters						
EPA 110.2	Color	Filtered	ACU	2	5	CALTEST
EPA 130.2	Hardness, total as $CaCO_3$	Unfiltered	mg/L	3	5	CALTEST
EPA 180.1	Turbidity	Unfiltered	NTU	0.1	1	CALTEST
EPA 160.1	Total Dissolved Solids (TDS)	Filtered	mg/L	6	10	CALTEST
EPA 160.2	Total Suspended Solids (TSS)	Particulate	mg/L	2	3	CALTEST
EPA 415.1	Organic Carbon	Unfiltered	mg/L	0.3	0.5	CALTEST
Pathogen Indicators						
SM 9223B	E. Coli bacteria	NA	MPN/100 mL	2	2	CALTEST
Organophosphorus Pesticides						
EPA 625(m)	Azinphos-methyl	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Chlorpyrifos	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Diazinon	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Dimethoate	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Disulfoton	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Malathion	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Methamidophos	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Methidathion	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Parathion, Methyl	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Parathion, Ethyl	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Phorate	Unfiltered	µg/L	0.01	0.02	CRG
EPA 625(m)	Phosmet	Unfiltered	µg/L	0.05	0.1	CRG
Carbamate and Urea Pesticides						
EPA 8321	Aldicarb	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Carbaryl	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Carbofuran	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Diuron	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Linuron	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Methiocarb	Unfiltered	µg/L	0.2	0.4	APPL
EPA 8321	Methomyl	Unfiltered	µg/L	0.05	0.07	APPL
EPA 8321	Oxamyl	Unfiltered	µg/L	0.2	0.4	APPL
Organochlorine pesticides						
EPA 625(m)	4,4'-DDT (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	4,4'-DDE (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	4,4'-DDD (o,p' and p,p')	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Dicofol	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Dieldrin	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Endrin	Unfiltered	µg/L	0.001	0.005	CRG
EPA 625(m)	Methoxychlor	Unfiltered	µg/L	0.001	0.005	CRG

Table 5 (cont.). Laboratory Method Detection Limit and Quantitation Limit (QL) Requirements for Analyses of Surface Water for SVWQC Monitoring and Reporting Program Plan

Method	Analyte	Fraction	Units	MDL	QL	LAB
Pyrethroid Pesticides						
EPA 625(m)	Biphenthrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Cyfluthrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Cypermethrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Esfenvalerate/Fenvalerate	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Lambda-Cyhalothrin	Unfiltered	µg/L	0.005	0.025	CRG
EPA 625(m)	Permethrin	Unfiltered	µg/L	0.005	0.025	CRG
Herbicides						
EPA 625(m)	Atrazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Simazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 625(m)	Molinate	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Thiobencarb	Unfiltered	µg/L	0.05	0.1	CRG
EPA 625(m)	Cyanazine	Unfiltered	µg/L	0.005	0.01	CRG
EPA 549.2	Paraquat	Unfiltered	µg/L	0.2	0.5	APPL
EPA 547	Glyphosate	Unfiltered	µg/L	2	10(1)	APPL
Trace Elements						
EPA 200.8	Arsenic	Filtered, Unfiltered	µg/L	0.08	0.5	CALTEST
EPA 200.8	Cadmium	Filtered, Unfiltered	µg/L	0.04	0.1	CALTEST
EPA 200.8	Copper	Filtered, Unfiltered	µg/L	0.2	0.5	CALTEST
EPA 200.8	Lead	Filtered, Unfiltered	µg/L	0.02	0.25	CALTEST
EPA 200.8	Nickel	Filtered, Unfiltered	µg/L	0.2	0.5	CALTEST
EPA 200.8	Selenium	Unfiltered	µg/L	0.5	2	CALTEST
EPA 200.8	Zinc	Filtered, Unfiltered	µg/L	0.3	10	CALTEST
EPA 2008/200.7	Boron	Filtered, Unfiltered	µg/L	2	10	CALTEST
Nutrients						
EPA 350.2	Ammonia as N	Unfiltered	mg/L	0.02	0.1	CALTEST
EPA 300	Nitrate as N	Unfiltered	mg/L	0.02	0.1	CALTEST
EPA 354.1	Nitrite as N	Unfiltered	mg/L	0.002	0.03	CALTEST
EPA 351.3	Total Kjeldahl Nitrogen	Unfiltered	mg/L	0.07	0.1	CALTEST
EPA 365.2	Soluble Orthophosphate	Unfiltered	mg/L	0.01	0.05	CALTEST
EPA 365.2	Phosphorus, Total	Unfiltered	mg/L	0.01	0.1(1)	CALTEST

(1) These QLs are higher than those specified in the R5-2005-0833 MRP document but are adequate to assess compliance with water quality objectives and potential impacts on beneficial uses.

Monitoring Results

The following sections summarize the monitoring conducted by the Coalition and its subwatershed partners for the 2008 Irrigation Season (April 2008 through October 2008).

SUMMARY OF SAMPLE EVENTS CONDUCTED

This report presents Irrigation Season monitoring results from six Coalition Irrigation Season sampling events (Events 028-033), as well as data for events conducted by coordinating Subwatershed monitoring programs between April 2008 and October 2008. Samples collected for all of these events are listed in **Table 6**. Monitoring conducted by Subwatershed monitoring programs coordinating with the Coalition monitoring effort is included in this document and also summarized in **Table 6**.

The Coalition and Subwatershed monitoring events were conducted during seasonally normal dry weather. Event monitoring analyses included water chemistry and aquatic toxicity. Sediment toxicity testing was also conducted by the Coalition twice during this Irrigation Season (in April and August), as specified in the MRPP and QAPP. The sites and parameters for all events were monitored in accordance with the Coalition's MRPP and QAPP.

The field logs for all Coalition and Subwatershed samples collected for the April 2008 through October 2008 events, as well as associated photographs, are provided in **Appendix A**.

Table 6. Sampling for the Coalition Irrigation Season Monitoring: April 2008 – October 2008

Agency	Subwatershed	Site Name	Sample Count		Irrigation Season Events[1]						
			Planned	Collected	APR	MAY	JUN	JUL	AUG	SEP	OCT
Sacramento Valley Water Quality Coalition (SVWQC)											
	Butte-Sutter-Yuba	Grasshopper Sl. at Forty Mile Rd	2	0	**DRY**	**DRY**	---	---	---	---	---
		Lower Snake R. at Nuestro Rd	6	8	4/22*	5/20	6/18	7/15	8/19*, 8/27	9/16, **9/23**	
		Sacramento Slough at Karnak	6	6	4/29*	5/13	6/3	7/1	8/26*	9/3[3], 9/16	---
	Colusa Basin	Freshwater Creek at Gibson Rd	6	6	4/22*	5/20	6/19	7/15	8/19*	9/17	---
		Logan Cr. at 4 Mile-Excelsior Rd	6	6	4/22*	5/21	6/18	7/16	8/20*	9/17	---
		Lurline Creek at 99W	6	6	4/22*	5/20	6/18	7/15	8/19*	9/17	---
		Walker Creek at Co Rd 48	6	9	4/23*	5/21, **5/22**	6/19, **6/20**	7/16, **7/17**	8/20*	9/17	---
		Colusa Drain above KL	6	6	4/29*	5/13	6/3	7/1	8/26*	9/16	---
	El Dorado	North Canyon Creek	3	3	---	---	---	7/15	8/19*	9/15	---
		Coon Hollow Creek[4]	2	3	**NO IRR.**	5/20*, **5/29**	6/18	---	---	---	---
	Lake-Napa	Middle Creek u/s Hwy 20	2	1	4/23*	---	---	---	**DRY***	---	---
	Placer-NSac-Nev-SSutter	Coon Creek at Brewer Rd	6	7	4/21*	5/20	6/18	7/15	8/19*, **8/27**	9/16	---
	Sac-Amador	Laguna Creek at Alta Mesa Rd	6	8	4/21*	5/19	**6/17**[2]	7/14	8/18*	9/16	---
		Grand Island Drain at Leary Rd	6	6	4/21*	5/19	6/17	7/14	8/18*	9/16	---
	Shasta-Tehama	Coyote Creek at Tyler Rd	6	6	4/23*	5/21	6/19	7/16	8/20*	9/18	---
	Solano-Yolo	Willow Slough Bypass	6	6	4/21*	5/19	6/17	7/14	8/18*	9/15	---
		Cache Cr. at Diversion Dam	6	7	4/23*	5/21	6/19	7/16, **7/23**	8/20*	9/18	---
		Ulatis Creek at Brown Road	6	7	4/21*, 4/30	5/19	6/17	7/14	8/18*	9/15	---
		Shag Sl. at Liberty Island Bridge	6	6	4/21*	5/19	6/17	7/14	8/18*	9/15	---
Northeastern California Water Association (NECWA)											
	Pit River	Pit River at Pittville	6	7	4/25	5/19	6/27	**7/8**, 7/28	8/26	---	10/9
		Fall R. at Fall R. Ranch Bridge	6	6	4/25	5/19	6/27	7/28	8/26	---	10/9
		Pit River at Canby Bridge	6	7	4/25	5/19	6/27	**7/7**, 7/28	8/26	---	10/9
Putah Creek Watershed Group (PCWG)											
	Lake-Napa	Pope Cr u/s from L. Berryessa	1	1	---	5/1	---	---	---	---	---
		Capell Cr u/s from L. Berryessa	1	1	---	5/1	---	---	---	---	---
Upper Feather River Watershed Group (UFRW)											
	Upper Feather	Spanish Cr. below Greenhorn Cr	6	6	---	5/6	6/3	7/8	8/5	9/2	10/7
		Indian Creek at Arlington Bridge	6	6	---	5/6	6/3	7/8	8/5	9/2	10/7
		Middle Fk Feather R. abv Grizzly Ck	6	6	---	5/6	6/3	7/8, **7/9**	8/5	9/2	10/7
		Totals	**137**	**147**							

DRY – Site was dry; no samples collected.
NO IRR. – No irrigation; no samples collected.
* - Sediment sample collected
(1) "—" = no samples planned. **Bold =** follow-up sampling.
(2) Follow-up sampling conducted at upstream sites
(3) Site resampled for previous event due to bottle breakage during shipment
(4) COONH site was changed to NRTCN site in July 2008.

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SAMPLE CUSTODY

All samples that were collected for the Coalition monitoring effort met the requirements for sample custody. Sample custody must be traceable from the time of sample collection until results are reported. A sample is considered under custody if:

- it is in actual possession;
- it is in view after in physical possession; and
- it is placed in a secure area (i.e., accessible by or under the scrutiny of authorized personnel only after in possession).

The chain-of-custody forms (COCs) for all samples collected by Coalition contractors for the monitoring events conducted from April 2008 through October 2008 are included with the related lab reports and are provided in **Appendix B**. All COCs for *ILRP* monitoring conducted by Coalition partners during this same period are also provided in **Appendix B** with their associated lab reports.

QUALITY ASSURANCE RESULTS

The Data Quality Objectives (DQOs) used to evaluate the results of the Coalition monitoring effort are detailed in the Coalition's QAPP (SVWQC 2006). These DQOs are the detailed quality control specifications for precision, accuracy, representativeness, comparability, and completeness. These DQOs are used as comparison criteria during data quality review to determine if the minimum requirements have been met and the data may be used as planned.

Results of Field and Laboratory QC Analyses

Quality Control (QC) data are summarized in **Table 7** through **Table 14** and discussed below. All program QC results are included with the lab reports in **Appendix B** of this document, and any qualifications of the data provided were retained and are presented with the tabulated monitoring data. Monitoring results for all programs discussed are tabulated in **Appendix C**.

Hold Times

Results were evaluated for compliance with required preparation and analytical hold times. With the exceptions discussed below, all analyses met the target data quality objectives for hold times:

- Four *E. coli* results were incubated 2.5 hours past the normal period and were qualified as *high biased.*

Method Detection Limits and Quantitation Limits

Target Method Detection Limits (MDL) and Quantitation Limits (QL) were assessed for all parameters. With the exceptions discussed below, analyses met the target data quality objectives:

- 37 of 105 EPA 130.2 / SM2340B results (hardness) had QLs greater than the project DQO due to dilution required to analyze the samples. All results were many times greater than the elevated QLs. The elevated analytical QLs for hardness were adequate to assess exceedances of associated water quality objectives for trace metals.

- 2 of 103 EPA 160.1 results (total dissolved solids) had QLs greater than the project DQO due to dilution required to analyze the samples. All results were many times greater than the elevated QLs. The elevated analytical QLs were adequate to assess exceedances of associated water quality objectives.
- 25 of 122 EPA 160.2/SM 2450D results (total suspended solids) had QLs greater than the project DQO due to dilution required to analyze the samples. Most associated results were greater than the elevated QLs and were not adversely affected. Four results were potentially affected and were qualified as below detection (ND) or below quantitation (DNQ).
- 1 of 1712 EPA 200.8 results (trace metals) had QLs greater than the project DQO due to dilution required to analyze the samples. The associated boron result was many times greater than the elevated QL and was not adversely affected.
- 3 of 85 EPA 547 results (glyphosate) had QLs and MDLs greater than the Project DQO due to dilution required to analyze the samples. All affected results were below the MDL. The elevated analytical QLs were adequate to assess exceedances of associated water quality objectives.
- 12 of 99 EPA 549.2 results (paraquat) had QLs and MDLs greater than the Project DQO due to dilution required to analyze the samples. All affected results were below the MDL.
- 1 of 2,626 EPA 8321 results had a QL and MDL greater than the Project DQOs due to dilution required to analyze the sample within the analytical calibration range. The associated diuron result was greater than the elevated QL and was not adversely affected. The elevated analytical MDL and QL were adequate to assess exceedances of associated water quality objectives.

Field Blanks

Field blanks were collected and analyzed for analyses of coliform bacteria, total organic carbon, ultraviolet absorbance, trace metals, and pesticides. With the exceptions discussed below, analytes of interest were generally not detected in field blanks:

- Trace metals were detected above the QL in 12 field blank analyses. This resulted in 8 analytical results being qualified as an upper limit due to potential contamination. The qualifications did not affect assessment of any exceedances.
- Total phosphorus was detected above the QL in one field blank analysis. One analytical result required qualification. Assessment of exceedances was not affected.
- Total organic carbon was detected above the QL in five field blank analyses. Two analytical results required qualification. The qualifications did not affect assessment of any exceedances.

Field Duplicates

Field duplicate samples were collected and analyzed for all parameters. The data quality objective for field duplicates is a Relative Percent difference (RPD) not exceeding 25%. With the exceptions discussed below, all field replicates met this data quality objective:

- Field duplicate RPD results exceeded the DQO for 1 TDS result. One environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Field duplicate results exceeded the DQO for 4 TSS results. Four environmental results were qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Field duplicate RPD results exceeded the DQO for 3 turbidity results. Three environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Field duplicate RPD results exceeded the DQO for 10 metals results. Ten environmental results were qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Field duplicate RPD results exceeded the DQO for 1 dissolved orthophosphate result. One environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Field duplicate RPD results exceeded the DQO for 2 toxicity tests. One environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.

Method Blanks

Method blanks were analyzed for TDS, TSS, TOC, turbidity, trace metals, nutrients, and pesticides. The data quality objective for method blanks is no detectible concentrations of the analyte of interest. With the exceptions discussed below, all analyses met this data quality objective:

- Total organic carbon was detected above the PQL in 1 method blank analysis. Six analytical results were qualified as a result of potential analytical contamination. The qualifications did not affect assessment of any exceedances.
- Trace metals were detected above the PQL in 2 total method blank analyses. No analytical results were qualified as a result of potential analytical contamination.

Laboratory Control Spikes and Surrogates

Laboratory Control Spike (LCS) recoveries were analyzed for TDS, TSS, TOC, trace metals, nutrients, and pesticides. Surrogate recoveries were analyzed for organophosphorus and carbamate pesticides. The data quality objective for Laboratory Control Spikes (LCS) is 80-120% recovery of the analytes of interest for most analytes. The data quality objectives for Laboratory Control Sample recoveries and surrogate recoveries of pesticides vary by analyte and surrogate and are based on the standard deviation of actual recoveries for the method.

- The results of 40 LCS recovery analyses and 3 surrogate recovery analyses for pesticides by EPA 625(m) were outside the acceptable recovery DQO. Sixteen analytical results were qualified as *low biased* as a result of low recoveries. No environmental results required qualification as *high biased*.

- The results of 8 LCS recovery analyses and 2 surrogate recovery analyses for pesticides by EPA 8321 were outside the acceptable recovery DQO. Two environmental results were qualified as *low biased* as a result of low recoveries.
- The results of 5 LCS recovery analyses for paraquat by EPA 549.2 were outside the acceptable recovery DQO. No environmental results required qualification.

Laboratory Duplicates

Laboratory Duplicates were analyzed for TDS, TSS, turbidity, and pesticides (**Table 12**). The data quality objective for laboratory duplicates is a Relative Percent difference (RPD) not exceeding 20%. With the exceptions discussed below, all laboratory duplicate analyses met this data quality objective:

- Laboratory duplicate results exceeded the DQO for 1 TSS result. One environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Laboratory duplicate results exceeded the DQO for 1 selenium result. One environmental result was qualified as *estimated* on this basis. The qualifications did not affect assessment of any exceedances.
- Laboratory duplicate results exceeded the DQO for 3 analyses of pesticides by EPA 8321. No environmental results required qualification on this basis.

Matrix Spikes and Matrix Spike Duplicates

Matrix Spikes and Matrix Spike Duplicates were analyzed for trace metals, nutrients, and pesticides (**Table 13** and **Table 14**). The data quality objective for matrix spikes is 80-120% recovery of most analytes of interest. The data quality objective for matrix spike recoveries of pesticides varies for each analyte or surrogate and is based on the standard deviation of actual recoveries for the method. The data quality objective for matrix spike duplicates is a Relative Percent difference (RPD) not exceeding 20%. With the exceptions discussed below, all analyses met these data quality objectives:

- Matrix Spike recoveries for 6 hardness analyses (including 5 non-project samples) by EPA 130.2 were outside the DQO. One associated result required qualification as *high biased*.
- Matrix Spike recoveries for 28 metals analyses by EPA 200.8 were outside the DQO. Three associated results were qualified as *high biased*, and four were qualified as *low biased*.
- Matrix Spike recoveries for 10 non-project samples nitrate analyses by EPA 300 were outside the DQO. No associated project results required qualification.
- Matrix Spike recoveries for 2 total phosphate analyses by EPA 365.2 were outside the DQO. One associated result required qualification as *low biased*.
- Matrix Spike recoveries for 2 total organic carbon analyses by EPA 415.1 were outside the DQO. One associated result required qualification as *high biased*.

- Matrix Spike recoveries for 9 paraquat analyses by EPA 549.2 were outside the DQO. All results associated with high recoveries were below detection did not require qualification. One associated result required qualification as *low biased*.
- Matrix Spike recoveries for 68 pesticide analyses by EPA 625m were outside the DQO. All results associated with high recoveries were below detection did not require qualification. Twenty-seven associated result required qualification as *low biased*.

Summary of Precision and Accuracy

Based on the QC data for the monitoring discussed above, the precision and accuracy of the majority of monitoring results meet the DQOs, and there were no systematic sampling or analytical problems. These data are adequate for the purposes of the Coalition's monitoring program, and few results required qualification. Of the 104 total qualified data, 45 results were qualified as *estimated* due to high variability in lab or field replicate analyses, 44 results were qualified as *high biased* or *low biased*, and 26 results were potentially affected by contamination and qualified as *upper limits*. Of the results qualified as *upper limits*, 1 was below the QL, and none of the data qualified as *upper limits* were exceedances. Of the 13,461 environmental analytical results generated from April 2008 through October 2008, 13,357 results required no qualification, resulting in 99.23% valid and unqualified data with no restrictions on use.

Completeness

The objectives for completeness are intended to apply to the monitoring program as a whole. As summarized in **Table 6**, 134 of the 137 initial water column samples planned by the Coalition and coordinating programs were collected, and all collected samples were analyzed, for an overall sampling success rate of 98%. An additional 14 follow-up samples were also collected and analyzed. Three samples planned for the 2008 Irrigation Season (3) were not collected. Planned sampling that was not completed successfully is summarized below:

- Two (2) samples planned for Grasshopper Slough (GRHPR) were not collected because the sampling site was dry. This site was visited for subsequent event to confirm the dry condition, but was not sampled.
- One sample event planned for Middle Creek (MDLCR) was not collected because the site was dry (August 2008).

Table 7. Summary of Field Blank Quality Control Sample Evaluations for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	< PQL	5	5	100
EPA 200.8	Trace Metals	< PQL	104	92	88.5
EPA 300/353.2	Nitrate, as N	< PQL	7	7	100
EPA 350.2	Ammonia, as N	< PQL	6	6	100
EPA 351.3	Total Kjeldahl Nitrogen	< PQL	6	6	100
EPA 354.1	Nitrite, as N	< PQL	6	6	100
EPA 365.2/SM 4500 P	Total Phosphorus, as P	< PQL	7	6	85.7
EPA 365.2 (filtered)	Dissolved Orthophosphate, as P	< PQL	6	6	100
EPA 415.1	Total Organic Carbon (TOC)	< PQL	6	1	16.7
EPA 547	Glyphosate	< PQL	6	6	100
EPA 549.2	Paraquat	< PQL	7	7	100
EPA 625m	Organophosphorus, Organochlorine, and Triazine, Pesticides	< PQL	395	395	100
EPA 8321A	Carbamate Pesticides	< PQL	150	150	100
SM20-9223	E. coli	< PQL	6	6	100
Totals			**717**	**699**	**97.5**

Table 8. Summary of Field Duplicate Quality Control Sample Results for SVWQC Monitoring: April 2008 – October 2008

Method		Data Quality Objective	Number Analyses	Number Passing	% Success
EPA 130.2	Hardness	RPD ≤ 25%	5	5	100.0
EPA 160.1	Total Dissolved Solids (TDS)	RPD ≤ 25%	6	5	83.3
EPA 160.2	Total Suspended Solids (TSS)	RPD ≤ 25%	7	3	42.9
EPA 180.1	Turbidity	RPD ≤ 25%	7	4	57.1
EPA 200.8	Trace Metals	RPD ≤ 25%	88	78	88.6
EPA 300	Nitrate, as N	RPD ≤ 25%	6	6	100.0
EPA 350.2	Ammonia as N	RPD ≤ 25%	5	5	100.0
EPA 351.3	Total Kjeldahl Nitrogen	RPD ≤ 25%	5	5	100.0
EPA 354.1	Nitrite, as N	RPD ≤ 25%	6	6	100.0
EPA 365.2	Phosphate as P, Total	RPD ≤ 25%	5	5	100.0
EPA 365.2 (filtered)	Dissolved Orthophosphate, as P	RPD ≤ 25%	6	5	83.3
EPA 415.1	Total Organic Carbon (TOC)	RPD ≤ 25%	5	5	100.0
EPA 547	Glyphosate	RPD ≤ 25%	6	6	100.0
EPA 547	Paraquat	RPD ≤ 25%	7	7	100.0
EPA 625m	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	RPD ≤ 25%	383	383	100.0
EPA 8321	Carbamate Pesticides	RPD ≤ 25%	175	175	100.0
Toxicity tests	Ceriodaphnia, Selenastrum, Hyalella	RPD ≤ 25%	21	19	90.5
Totals			**743**	**722**	**97.2**

Table 9. Summary of Method Blank Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	< MDL	27	27	100
EPA 160.1	Total Dissolved Solids	< MDL	26	26	100
EPA 160.2	Total Suspended Solids	< MDL	25	25	100
EPA 180.1	Turbidity	< MDL	28	28	100
EPA 200.8	Trace Metals	< MDL	553	551	100
EPA 300	Nitrate, as N	< MDL	30	30	100
EPA 350.2	Ammonia as N	< MDL	26	26	100
EPA 351.3	Total Kjeldahl Nitrogen	< MDL	34	34	100
EPA 354.1	Nitrite, as N	< MDL	25	25	100
EPA 365.2	Phosphate/Orthophosphate, as P	< MDL	61	61	100
EPA 415.1	Total Organic Carbon	< MDL	31	29	94
SM20-9223	E. coli	< MDL	26	26	100
EPA 547	Glyphosate	< MDL	12	12	100
EPA 549.2	Paraquat	< MDL	15	15	100
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	< MDL	855	855	100
EPA 8321	Carbamate Pesticides	< MDL	325	325	100
Totals			**2099**	**2095**	**99.8**

Table 10. Summary of Lab Control Spike Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	80-120%	27	27	100
EPA 160.1	Total Dissolved Solids	80-120%	26	26	100
EPA 160.2	Total Suspended Solids	80-120%	25	25	100
EPA 200.8	Trace Metals	80-120%	28	28	100
EPA 350.2	Ammonia as N	80-120%	553	553	100
EPA 351.3	Total Kjeldahl Nitrogen	80-120%	31	31	100
EPA 300	Nitrate, as N	80-120%	34	34	100
EPA 354.1	Nitrite, as N	80-120%	31	31	100
EPA 365.2	Phosphate/Orthophosphate, as P	80-120%	25	25	100
EPA 415.1	Total Organic Carbon	80-120%	51	51	100
EPA 547	Glyphosate	78-128%	31	31	100
EPA 549.2	Paraquat	42-104%	24	24	100
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	(1)	15	10	66.7
EPA 8321	Carbamate Pesticides	(1)	1778	1738	97.8
Totals			**375**	**367**	**97.9**

1. Data Quality Objectives for pesticide LCS recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 11. Summary of Surrogate Recovery Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	(1)	624	621	99.5
EPA 8321	Carbamate Pesticides	(1)	211	209	99.1
Totals			**835**	**830**	**99.4**

1. Data Quality Objectives for pesticide Surrogate recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 12. Summary of Lab Duplicate Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Pairs Analysed	Number Passing	% Success
EPA 130.2	Hardness	≤20% RPD	1	1	100.0
EPA 160.1	Total Dissolved Solids	≤20% RPD	26	26	100
EPA 160.2	Total Suspended Solids	≤20% RPD	25	24	96
EPA 180.1	Turbidity	≤20% RPD	27	27	100
EPA 200.8	Trace Metals	≤20% RPD	8	7	88
EPA 547	Glyphosate	≤20% RPD	12	12	100
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	≤25% RPD	349	349	100
EPA 8321	Carbamate Pesticides	≤25% RPD	50	47	94.0
Totals			**498**	**493**	**99.0**

Table 13. Summary of Matrix Spike Recovery Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Analyses	Number Passing	% Success
EPA 130.2	Hardness	80-120%	54	48	88.9
EPA 200.8	Trace Metals	80-120%	1122	1094	97.5
EPA 350.2	Ammonia as N	80-120%	52	52	100.0
EPA 351.3	Total Kjeldahl Nitrogen	80-120%	68	68	100.0
EPA 300	Nitrate, as N	80-120%	50	40	80.0
EPA 354.1	Nitrite, as N	80-120%	50	50	100.0
EPA 365.2	Phosphate/Orthophosphate, as P	80-120%	104	102	98.1
EPA 415.1	Total Organic Carbon	80-120%	82	80	97.6
EPA 547	Glyphosate	78-128%	12	12	100.0
EPA 549.2	Paraquat	50-126%	12	3	25.0
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	(1)	776	708	91.2
EPA 8321	Carbamate Pesticides	(1)	266	266	100.0
Totals			**2648**	**2523**	**95.3**

1. Data Quality Objectives for pesticide matrix spike recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 14. Summary of Matrix Spike Duplicate Precision Results for SVWQC Monitoring: April 2008 – October 2008

Method	Analyte	Data Quality Objective	Number of Pairs Analyzed	Number Passing	% Success
EPA 130.2	Hardness	80-120%	18	18	100.0
EPA 200.8	Trace Metals	≤20% RPD	378	377	99.7
EPA 350.2	Ammonia as N	≤20% RPD	18	18	100.0
EPA 351.3	Total Kjeldahl Nitrogen	≤20% RPD	23	23	100.0
EPA 300	Nitrate, as N	≤20% RPD	17	17	100.0
EPA 354.1	Nitrite, as N	≤20% RPD	17	17	100.0
EPA 365.2	Phosphate/Orthophosphate, as P	≤20% RPD	38	38	100.0
EPA 415.1	Total Organic Carbon	≤20% RPD	30	30	100.0
EPA 547	Glyphosate	≤20% RPD	6	6	100.0
EPA 549.2	Paraquat	≤20% RPD	6	6	100.0
EPA 625(m)	Organophosphorus, Organochlorine, Triazine, and Pyrethroid Pesticides	≤30% RPD	388	388	100.0
EPA 8321	Carbamate Pesticides	≤25% RPD	137	130	94.9
Totals			**1076**	**1068**	**99.3**

TABULATED RESULTS OF LABORATORY ANALYSES

The tabulated results for all validated and Quality Assurance-evaluated (QA) data are provided in **Appendix C**. This appendix includes results for non-target pesticide analytes reported along with the pesticides of primary interest for the Coalition's monitoring program. Copies of final laboratory reports, including chromatographs for pesticide analyses, and all reported QA data for Coalition monitoring results are provided in **Appendix B**.

Pesticide Use Information

Typically, pesticide use information for the pesticides of primary concern in the Sacramento Valley watershed are acquired from the California Department of Pesticide Regulations' (CDPR) Pesticide Use Reporting (PUR) Database[1] and compiled for the subwatersheds. The pesticide use information for 2007 was not yet available when the database website was last accessed, on December 8, 2008. Please refer to the *2007 Irrigation Season Semi-Annual Monitoring Report* for the most recent pesticide use summary.

[1] Available at: http://www.cdpr.ca.gov/docs/pur/purmain.htm

Data Interpretation

SUMMARY OF SAMPLING CONDITIONS

Sample collection for the April 2008 – October 2008 Coalition Irrigation Season was characterized by predominantly dry weather with above average mean temperatures.[2] The 2008 Irrigation Season began early in most regions due to below-average precipitation during the 2008 Storm Season (following above-average precipitation in January). The region is currently considered to be in a severe drought condition.

Month (2008)	Departure from Normal Mean	Days with Maximum Temperature ≥ 90°F	Precipitation Total (Inches)
April	-1.3	1	Trace amount
May	1.5	6	0.04
June	0.9	11	0.00
July	-0.3	19	0.00
August	1.2	21	0.00
September	0.5	15	0.00
October	-0.2	1	0.84

Based on climatic data available for the Sacramento Executive Airport weather station there was negligible rainfall during the 2008 irrigation season. A trace amount of rain fell in April, and 0.04 inches of rain was recorded in May. No precipitation occurred in June, July, August, or September. In October, 0.84 inches of rain fell; some rainfall occurred on October 2, 3, and 4 in the Red Bluff and Redding areas, prior to the UFRW sampling event on October 7[3]. The bulk of October precipitation occurred on October 30 and 31 (0.59 inches) after irrigation season sampling was completed.

The maximum temperature exceeded 90 degrees Fahrenheit on six days in May (including two days of triple-digit heat), 11 days in June, 19 days in July, 21 days in August, and 15 days in September. Record-setting high temperatures occurred throughout the Sacramento Valley in June, July, August, and September; the average maximum temperatures at the Sacramento Executive Airport were 89, 91.6, 92.7, and 89.1 degrees Fahrenheit, respectively.

ASSESSMENT OF DATA QUALITY OBJECTIVES

The QC data for the Coalition's monitoring program have been evaluated and discussed previously in this document (Quality Assurance Results, beginning page 25). Based on these evaluations, the program data quality objectives of completeness, representativeness, precision, and accuracy of monitoring data have largely been achieved. These results indicate that the data

[2] Climate data for Sacramento-Delta region available at: http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

[3] Climate data for Sacramento Executive Airport available at: http://www.weather.gov/climate/index.php?wfo=sto

collected are valid and adequate to support the objectives of the monitoring program, and demonstrate compliance with the requirements of the *ILRP*.

The results of these evaluations were summarized previously in **Table 7** through **Table 13**.

EXCEEDANCES OF RELEVANT WATER QUALITY OBJECTIVES

Coalition and subwatershed monitoring data were compared to applicable narrative and numeric water quality objectives in the Central Valley Basin Plan (CVRWQCB 1995), subsequent adopted amendments, and the California Toxics Rule (USEPA 2000). Observed exceedances of these recognized regulatory thresholds are the focus of this discussion. Other relevant water quality thresholds (e.g., recommended toxicity-based criteria or non-regulatory toxicity thresholds) were considered for the purpose of identifying potential causes of observed toxicity. It should be noted that these unadopted limits are not appropriate criteria for determining exceedances for the purpose of the Coalition's monitoring program and evaluating compliance with the *ILRP*. The additional thresholds considered include USEPA aquatic life criteria (USEPA 1999) that were not included in the California Toxics Rule, USEPA Maximum Contaminant Levels (MCL) for drinking water, and minimum toxic thresholds from USEPA's Office of Pesticide Programs (OPP) Ecotoxicity database (USEPA 2002c). Water quality objectives and other relevant water quality thresholds discussed in this section are summarized in **Table 15** and **Table 16**. Monitored analytes without relevant water quality objectives are listed in **Table 17**.

The data evaluated for exceedances in this document include all Coalition collected results, as well as the compiled results from the Subwatershed monitoring programs presented in this report. The results of these evaluations are discussed below.

Table 15. Basin Plan and California Toxics Rule Objectives for Analytes Monitored for the 2008 Irrigation Season

Analyte	Most Stringent Objective[1]	Units	Objective Source[2]
Ammonia, Total as N	narrative	mg/L	Basin Plan
Arsenic, dissolved	150	ug/L	CTR
Arsenic, total	50	ug/L	CA 1˚ MCL
Atrazine	1	ug/L	CA 1˚ MCL
Cadmium, dissolved	hardness dependent[4]	ug/L	CTR
Carbofuran	0.4	ug/L	Basin Plan
Chlorpyrifos	0.015	ug/L	Basin Plan Amendment
Color	15[3]	CU	CA 1˚ MCL
Copper, dissolved	hardness dependent[4]	ug/L	CTR
DDD (o,p' and p,p')	0.00083	ug/L	CTR
DDE (o,p' and p,p')	0.00059	ug/L	CTR
DDT (o,p' and p,p')	0.00059	ug/L	CTR
Diazinon	0.10	ug/L	Basin Plan Amendment
Dieldrin	0.00014	ug/L	CTR
Dissolved Oxygen	5	mg/L	Basin Plan
Endrin	0.036	ug/L	CTR
Fecal coliform	400	MPN/100mL	Basin Plan
Glyphosate	700	ug/L	CA 1˚ MCL
Lead, dissolved	hardness dependent[4]	ug/L	CTR
Malathion	0.1	ug/L	Basin Plan
Molinate	10	ug/L	Basin Plan
Nickel, dissolved	hardness dependent[4]	ug/L	CTR
Nitrate, as N	10	mg/L	CA 1˚ MCL
Nitrite, as N	1	mg/L	CA 1˚ MCL
Oxamyl	200	ug/L	CA 1˚ MCL
Parathion, Methyl	0.13	ug/L	Basin Plan
pH	6.5-8.5	-log[H+]	Basin Plan
Selenium, total	5	ug/L	Basin Plan
Simazine	4	ug/L	CA 1˚ MCL
Temperature	narrative	ug/L	Basin Plan
Thiobencarb	1	ug/L	Basin Plan
Total Suspended Solids	narrative	mg/L	Basin Plan
Toxicity, Algae Cell Density	narrative	ug/L	Basin Plan
Toxicity, Fathead Minnow Survival	narrative	ug/L	Basin Plan
Toxicity, Water Flea Survival	narrative	ug/L	Basin Plan
Turbidity	narrative	ug/L	Basin Plan
Zinc, dissolved	hardness dependent[4]	ug/L	CTR

1. For analytes with more than one limit, the most limiting applicable adopted water quality objective is listed.
2. CA 1˚ MCLs are the California's Maximum Contaminant Levels for treated drinking water; CTR indicates California Toxics Rule criteria.
3. Applies only to treated drinking water.
4. Objective varies with the hardness of the water.

Table 16. Unadopted Water Quality Limits for Analytes Monitored for the 2008 Irrigation Season

Analyte	Unadopted Limit[1]	Units	Limit Source
Boron, total	700	ug/L	Ayers and Westcott
Conductivity	900	uS/cm	CA Recommended 2° MCL
E. coli [1]	235	MPN/100mL	Basin Plan Amendment
Conductivity	700	uS/cm	Ayers and Westcott
Total Dissolved Solids	500	mg/L	CA Recommended 2° MCL
Total Dissolved Solids	450	mg/L	Ayers and Westcott

Note:
1. Adopted by the Water Board but not approved by State Water Resources Control Board

Table 17. Analytes Monitored for the 2008 Irrigation Season without Applicable Adopted or Unadopted Limits

Analytes	
Alkalinity	Orthophosphate, dissolved as P
Bromacil	Oryzalin
Dimethoate	Paraquat
Discharge	Phosphorus as P, Total
Diuron	Total Kjeldahl Nitrogen
Hardness	Total Organic Carbon

Toxicity and Pesticide Results

Statistically significant toxicity was observed in ten Coalition water quality samples collected from eight different sites for the six events conducted during the 2008 Irrigation Season. Significant toxicity to the algae *Selenastrum* was observed in three samples from three sites, significant toxicity to *Ceriodaphnia* was observed in six samples from four sites, and significant toxicity to fathead minnows (*Pimephales*) was observed in one sample. The greatest number of samples with significant toxicity (four cases) was observed during the second Irrigation Season event (Event 029, May 13 and May 19-21, 2008). Samples exhibiting statistically significant toxicity are summarized in **Table 18**. No samples exhibited significant sediment toxicity to *Hyalella*.

The observations of toxicity to *Selenastrum, Ceriodaphnia,* and *Pimephales* were considered exceedances of the Basin Plan narrative objective for toxicity ("*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life*."). The toxicity to *Pimephales* observed in the field duplicate sample collected at Willow Slough Bypass at Poleline in May was only a 10% reduction in survival, and this result was determined to be statistically less than the lab control; however, this difference was not considered to be toxicologically significant. Survival in the primary environmental sample was 100%; average survival for the two replicate samples was 95%. All statistically significant results for samples collected during the Coalition Irrigation Season monitoring were reported to the Water Board by the Coalition in "Exceedance Reports" and "Communication Reports" as required by the *ILRP* and the Coalition's MRPP. The Exceedance and Communication Reports detailing these results and required follow-up testing and results are provided in **Appendix D**. The results of these reports and of the follow-up testing conducted on the samples are summarized by event below.

Event 028, April 2008

Ulatis Creek at Brown Road (UCBRD)

In toxicity tests conducted with *Selenastrum*, the Coalition observed reductions in cell density of 45% compared to the control. Ambient follow-up samples collected on April 30, 2008 at UCBRD and SWNWR were not toxic to *Selenastrum*. This indicates that toxicity did not persist in ambient surface waters.

In the UCBRD sample, diuron was elevated (1.5 ug/L) but did not exceed the EPA benchmark of 2.4 ug/L for non-vascular aquatic plants. The detected diuron concentration likely contributed to the observed toxicity to *Selenastrum,* but may not have been the sole cause. Simazine was also detected in both the initial sample (0.0217 ug/L) and a field duplicate (0.0196 ug/L) collected at UCBRD but did not exceed or approach the EPA benchmark of 36 ug/L for non-vascular aquatic plants. No other detected pesticides or other analytes approached concentrations expected to cause or contribute to the observed *Selenastrum* toxicity. All other chemical parameters were below concentrations that would be expected to have adverse affects on *Selenastrum*.

Based on these results, diuron appears to be the most likely cause of toxicity identified in the UCBRD sample. Based on pesticide application data, the most likely source of the diuron detected in the sample was determined to be non-agricultural applications to rights of way. No other potential causes of the observed toxicity were indicated by the monitoring results.

Event 029, May 2008

Colusa Drain above Knight's Landing (COLDR)

In toxicity tests conducted with *Selenastrum*, the Coalition observed reductions in cell density of 88% compared to the control. Per the *California Rice Commission Algae Aquatic Toxicity Management Plan* (Final Submitted February 8, 2008), follow-up toxicity evaluations consist of supplemental analyses for herbicides and trace metals.

In the COLDR sample, no pesticides or other analytes were detected that fully explained the observed *Selenastrum* toxicity. Simazine was detected at a level (0.0127 ug/L) well below the EPA benchmark of 36 ug/L for non-vascular plants. The detected simazine concentration is not expected to cause toxicity to *Selenastrum*.

In the COLDR drainage, 41 different pesticides were applied in the month prior to sampling. Of these, copper, glyphosate, paraquat, diazinon, dimethoate, methomyl, and carbaryl are monitored in water for the ILRP and were analyzed in the COLDR sample. The unmonitored applied pesticides generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Selenastrum* based on the application data. Although simazine was detected at low concentrations in the COLDR sample, there were no applications reported in the month prior to sampling.

Based on the pesticide analyses and application data, no specific cause of the toxicity could be identified in the COLDR sample. The cause of toxicity was not a monitored herbicide. Many (15) unmonitored herbicides were applied in the COLDR drainage in the month prior to sampling. However, there was no significant precipitation in the two weeks before sampling, and there appeared to be a low risk of recently applied herbicides being transported in uncontrolled runoff to surface waters of Colusa Drain.

Coon Hollow Creek (COONH)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 50% compared to the control. A Toxicity Identification Evaluation (TIE) was initiated on May 29, 2008. Toxicity was not persistent in the baseline ambient water sample, but piperonyl butoxide (PBO) increased the toxicity, which is consistent with but not diagnostic of pyrethroid toxicity. The sediment toxicity test that was performed on the COONH sample collected during this event was not toxic to *Hyalella*, however, which is highly sensitive to pyrethroid pesticides. This sediment toxicity result indicates that pyrethroids were not likely present in concentrations sufficient to cause the observed toxicity to *Ceriodaphnia* in the COONH water sample.

In the COONH drainage, 15 different pesticides were applied in the month prior to sampling. Of these, only copper, atrazine, glyphosate, and carbaryl are monitored for the ILRP, and only copper was analyzed at the COONH site. Although chlorpyrifos was detected at low concentrations in the COONH sample, there were no applications reported in the month prior to sampling. There were no pyrethroid applications reported in the month prior to sampling.

In the COONH sample, no pesticides or other analytes were detected that fully explained the observed *Ceriodaphnia* toxicity. Chlorpyrifos was detected at a concentration (0.001 ug/L) well below the EPA benchmark of 0.05 ug/L for acute invertebrates and the Basin Plan objective of 0.015 ug/L. DDE was also detected. The detected chlorpyrifos and DDE concentrations are not expected to cause toxicity to *Ceriodaphnia*.

The *Ceriodaphnia* toxicity observed at COONH is consistent with the previously observed pattern of toxicity at this site. Based on the pesticide analyses and application data, no specific cause of the toxicity could be identified in the COONH sample. The cause of toxicity was not an MRP organophosphate pesticide. Based on the lack of toxicity in the TIE, the cause of toxicity was a rapidly degrading compound with a short environmental half-life. The lack of sediment toxicity to *Hyalella* and the lack of recently applied pyrethroids indicate that pyrethroid pesticides were probably not the cause of *Ceriodaphnia* toxicity. Several unmonitored insecticides were applied in the COONH drainage in the month prior to sampling. However, there was no significant precipitation in the two weeks before sampling, and based on the irrigation methods in the drainage (primarily drip irrigation) there appeared to be a low risk of recently applied pesticides being transported in runoff to surface waters of Coon Hollow Creek.

Freshwater Creek at Gibson Road (FRSHC)

The results of the *Pimephales* test for FRSHC were incorrectly reported as statistically significant in the initial exceedance report, and the results do not indicate an agricultural source of the toxicity. However, because some mortality was observed to Pimephales at FRSHC due to "pathogen-related mortality", at the request of Regional Board staff, the sample was re-tested using USEPA methods for controlling PRM. There was no mortality observed in the retested sample. Based on these results, the PRM was the only significant cause of mortality in the sample, and there was no indication of other underlying contributing factors.

Sacramento Slough Bridge near Karnak (SSKNK)

In toxicity tests conducted with *Selenastrum*, the Coalition observed reductions in cell density of 29% compared to the control.

In the SSKNK sample, no pesticides or other analytes were detected that fully explain the observed *Selenastrum* toxicity. Simazine was detected at a level (0.0205 ug/L) well below the EPA benchmark of 36 ug/L for non-vascular plants. The detected simazine concentration is not expected to cause toxicity to *Selenastrum*.

In the SSKNK drainage, eight different pesticides were applied in the month prior to sampling. Of these, only copper is monitored for the ILRP and was analyzed in the SSKNK sample. The unmonitored pesticides used generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Selenastrum* based on the application data. Although simazine was detected at low concentrations in the SSKNK sample, there were no applications reported in the month prior to sampling.

Based on the pesticide analyses and application data, no specific cause of the toxicity could be identified in the SSKNK sample. The cause of toxicity was not a monitored herbicide. Several (5) unmonitored herbicides were applied in the SSKNK drainage in the month prior to sampling. However, there was no significant precipitation in the two weeks before sampling, and there appeared to be a low risk of recently applied herbicides being transported in uncontrolled runoff to surface waters of Sacramento Slough.

Willow Slough Bypass at Poleline (WLSPL)

The 10% reduction in *Pimephales* survival for the WLSPL field duplicate sample did not trigger any follow-up actions in addition to reporting this result. Survival in the primary environmental

sample was 100%. Average survival for the two replicate samples was 95% and the reduction observed in the field duplicate did not appear to be toxicologically significant.

Event 030, June 2008

Coon Hollow Creek (COONH)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 70% compared to the control. Initiation of the TIE and follow-up sample triggered for the COONH *Ceriodaphnia* toxicity was deferred pending consideration of a request to the Water Board Executive Officer for a change in monitoring location and suspension of monitoring at the COONH site while alternative source identification measures are pursued. This request was approved by the Executive Officer on June 27, 2008.

The COONH sample was analyzed for organophosphate (OP) pesticides and organochlorine (OC) pesticides. No OP pesticides were detected, and one OC pesticide was detected below the quantitation limit (DDE at 0.0011 ug/L). Acute LC50s for related species in the genus (*Ceriodaphnia reticulata*) are several orders of magnitude higher (~44 ug/L), so DDE is not expected to be acutely toxic to *Ceriodaphnia* at the detected concentration. The concentrations of detected pesticides were not sufficient to have contributed to the observed toxicity to *Ceriodaphnia*. No other pesticides, trace metals, or other analytes approached concentrations expected to have adverse affects on *Ceriodaphnia* in these samples. No other potential causes were indicated by the monitoring results.

Twenty-five different pesticide products were applied in the month prior to sampling in the COONH drainage. Of these, only azinophos-methyl and atrazine are monitored for the ILRP, and only azinphos-methyl was monitored at the COONH site. Of the applied pesticides, azinphos-methyl is expected to have the greatest potential for causing *Ceriodaphnia* toxicity and had several applications in the week before sampling. However, azinphos-methyl was not detected in the COONH sample. The unmonitored pesticides generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Ceriodaphnia*, but the adjuvants, herbicides and fungicides are expected to have a relatively low potential to cause *Ceriodaphnia* toxicity.

Based on the pesticide analyses and application data, no likely cause of the toxicity was identified in the COONH sample. There was no significant precipitation in the two weeks before sampling, and based on the irrigation methods in the drainage (primarily drip irrigation) there appeared to be a low risk of recently applied pesticides being transported in runoff to surface waters of Coon Hollow Creek.

Event 031, July 2008

Cache Creek at Capay Diversion Dam (CCCPY)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 85% compared to the control. A follow-up sample was collected at CCCPY on July 23, 2008 and tested with *Ceriodaphnia* to evaluate persistence of ambient toxicity. Survival was 100% in the follow-up sample, indicating that ambient toxicity did not persist at CCCPY one week later.

A pesticide-targeted TIE was initiated on July 21, 2008 with the CCCPY sample. Sample treatments included centrifugation, piperonyl butoxide, and C_8-Solid Phase Extraction. There

was no toxicity in the baseline (untreated) CCCPY sample or any of the treated CCCPY samples. The lack of persistence of toxicity indicates that the cause of toxicity was subject to rapid degradation. This rapid loss of toxicity (in a sample stored under controlled conditions designed to preserve and minimize changes in the sample) indicates that persistence of toxicity would likely have been very brief under typical uncontrolled ambient environmental conditions.

All other chemical parameters were below concentrations that would be expected to have adverse affects on *Ceriodaphnia*. In the CCCPY sample, simazine was detected (0.0191 ug/L) at a level well below the EPA benchmark of 36 ug/L for non-vascular plants, or the benchmark of 500 ug/L for aquatic invertebrates. The detected simazine concentration is not expected to cause toxicity to *Ceriodaphnia*. No other pesticides were detected in the CCCPY sample, and no trace metals, or other analytes approached concentrations expected to have adverse affects on *Ceriodaphnia*. No other potential causes were indicated by the monitoring results, TIE, or follow-up sampling.

In the CCCPY drainage, 11 different pesticides were applied in the month prior to sampling. The applied pesticides include four fungicides and/or bactericides; three herbicides; and four insecticides and/or miticides (**Table 2**). Of these, only glyphosate and malathion are monitored in water for the ILRP and were analyzed (but not detected) in the CCCPY sample. The unmonitored pesticides used generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Ceriodaphnia* based solely on the application data. However, the fungicides and herbicides applied are generally considered to have relatively low acute toxicity to *Ceriodaphnia*. Although simazine was detected at low concentrations in the CCCPY sample, there were no applications reported in the month prior to sampling.

Based on the pesticide analyses and application data, no specific cause of the toxicity could be identified in the CCCPY sample. The cause of toxicity was not a monitored pesticide. Several unmonitored pesticides were applied in the CCCPY drainage in the month prior to sampling. However, there was no significant precipitation in the two weeks before sampling, and there appeared to be a low risk of recently applied pesticides being transported in uncontrolled runoff to surface waters of Cache Creek.

Event 032, August 2008

Lower Snake River at Nuestro Road (LSNKR)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 40% compared to the control. Follow-up samples were collected at LSNKR to assess persistence of toxicity to *Ceriodaphnia* in the ambient waters. There was no toxicity to *Ceriodaphnia* observed in the follow-up sample.

In the LSNKR sample, chlorpyrifos was detected (0.034 ug/L) below the EPA benchmark of 0.05 ug/L for acute invertebrate toxicity and above the Basin Plan water quality objective of 0.015 ug/L. The detected concentration of chlorpyrifos was sufficient to account for the observed reduction of *Ceriodaphnia* survival. No other pesticides were detected in the LSNKR sample, and no trace metals, or other analytes approached concentrations expected to have adverse affects on *Ceriodaphnia*. Based on these results, chlorpyrifos was the likely cause of the observed toxicity. Several different pesticides containing chlorpyrifos were applied in the month prior to sampling (July 19 – August 19, 2008). The pesticide analyses and application data

supported the conclusion that chlorpyrifos was the likely cause of *Ceriodaphnia* toxicity in the LSNKR sample.

Coon Creek at Brewer Road (CCBRW)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 40% compared to the control. *A* follow-up sample was collected at CCBRW to assess persistence of toxicity to *Ceriodaphnia* in the ambient waters. There was no toxicity to *Ceriodaphnia* observed in the follow-up sample.

In the CCBRW drainage, 35 different pesticides were applied in the month prior to sampling. The applied pesticides include six fungicides and/or bactericides; nine herbicides; and 20 insecticides and/or miticides (**Table 2**). Of these, glyphosate, paraquat, chlorpyrifos, diazinon, malathion, phosmet, and methyl parathion are monitored in water for the ILRP and were analyzed in the CCBRW sample. None of these pesticides were detected in the CCBRW sample for this event, and no trace metals, or other analytes approached concentrations expected to have adverse affects on *Ceriodaphnia*. The unmonitored pesticides used generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Ceriodaphnia* based on the application data. However, the fungicides and herbicides are generally considered to have relatively low acute toxicity to *Ceriodaphnia* compared to insecticides.

Based on the chemical analyses and application data, no specific cause of the toxicity could be identified in the CCBRW sample. Many unmonitored pesticides were applied in the CCBRW drainage in the month prior to sampling. However, there was no significant precipitation in the two weeks before sampling, and there appeared to be a low risk of recently applied pesticides being transported in uncontrolled runoff to surface waters of Coon Creek.

Event 033, September 2008

Lower Snake River at Nuestro Road (LSNKR)

In toxicity tests conducted with *Ceriodaphnia*, the Coalition observed reductions in cell survival of 95% compared to the control. Follow-up samples were collected at LSNKR on September 23, 2008 to assess persistence of toxicity to *Ceriodaphnia* in the ambient waters. There was no toxicity to *Ceriodaphnia* observed in the follow-up sample, indicating that ambient toxicity did not persist at LSNKR one week later.

A pesticide-targeted TIE was initiated on September 21, 2008 with the LSNKR sample. Sample treatments included centrifugation, piperonyl butoxide (PBO), and C8-Solid Phase Extraction. There was toxicity in the baseline (untreated) LSNKR sample, and toxicity was removed via the centrifugation and PBO treatments. These test results indicate that the results of the initially observed toxicity may have been caused by a contaminant that is particulate-associated and metabolically activated or by multiple contaminants with these properties.

There were no pesticides detected in the LSNKR sample, and no other chemicals were detected at concentrations that explain the observed toxicity. In the LSNKR drainage, 21 different pesticides were applied in the month prior to sampling. The applied pesticides include two fungicides; five herbicides; and 14 insecticides and/or miticides (**Table 2**). Of these, glyphosate, chlorpyrifos, dicofol, dimethodate, malathion, methomyl, and carbaryl are monitored in water for the ILRP and were analyzed in the LSNKR sample, and the naled breakdown product dichlorvos

is also monitored. None of these pesticides was detected in the LSNKR sample for this event. Several pyrethroid pesticides were applied, but their toxicity characteristics are not consistent with the TIE findings. The remaining unmonitored pesticides used generally do not have adequate toxicity data available to evaluate their potential to cause toxicity to *Ceriodaphnia* based on the application data. However, the fungicides and herbicides are generally considered to have relatively low acute toxicity to *Ceriodaphnia*.

TIE results indicated a metabolically activated, particulate-associated organic compound is responsible for the observed toxicity. Although two pesticides were applied that were consistent with these findings (chlorpyrifos and carbaryl), no pesticides or chemicals were detected that are consistent with the TIE results. Based on the pesticide analyses and application data, no specific cause of the toxicity could be identified in the LSNKR sample. There was no significant precipitation in the two weeks before sampling, and there appeared to be a low risk of recently applied pesticides being transported in uncontrolled runoff to surface waters of Lower Snake River. The two applied pesticides consistent with the TIE findings (chlorpyrifos and carbaryl) were not detected.

Table 18. Summary of Water Column Samples Exceeding the Basin Plan Narrative Toxicity Objective, April 2008 – October 2008

Site	Date	Species	% of Control
Ulatis Creek at Brown Road	4/21/2008	*Selenastrum* cell density	55%
Colusa Drain above KL	5/13/2008	*Selenastrum* cell density	12%
Coon Hollow Creek	5/20/2008	*Ceriodaphnia* survival	50%
Sacramento Slough Bridge near Karnak	5/13/2008	*Selenastrum* cell density	71%
Willow Slough Bypass at Poleline	5/19/2008	*Pimephales* survival	90%(1)
Coon Hollow Creek	6/18/2008	*Ceriodaphnia* survival	30%
Cache Creek at Capay Diversion Dam	7/16/2008	*Ceriodaphnia* survival	15%
Lower Snake River at Nuestro Road	8/19/2008	*Ceriodaphnia* survival	60%
Coon Creek at Brewer Road	8/19/2008	*Ceriodaphnia* survival	60%
Lower Snake River at Nuestro Road	9/16/2008	*Ceriodaphnia* survival	5%

1. Results are for the field duplicate sample. Survival in the primary environmental sample was 100%. The 10% reduction in *Pimephales* survival for the WLSPL field duplicate sample did not trigger any follow-up actions. Average survival for the two replicate samples was 95% and the observed statistically significant toxicity was not considered to be toxicologically significant.

Pesticides Detected in Coalition Monitoring

Pesticides were analyzed in 353 individual water column samples collected from April 2008 to October 2008. Analyses were conducted for organophosphates, carbamates, organochlorines, triazines, pyrethroids, glyphosate, and paraquat. Within these categories, 16 different pesticides were detected in 76 separate samples (out of 353 individual samples) collected for Coalition monitoring. Legacy organochlorines were detected in 6 samples from 4 sites. There were a total of 9 pesticide exceedances of water quality objectives: only 3 of these were for registered pesticides with the remaining 6 exceedances for legacy organochlorine pesticides with no current agricultural uses.

It should be noted that detected pesticides are not equivalent to exceedances. Two registered pesticides (chlorpyrifos and atrazine) and 2 unregistered legacy organochlorine pesticides (dieldrin and DDE) exceeded applicable water quality objectives in a total of 9 Irrigation Season 2008 samples. In only two cases were pesticides detected at concentrations with the potential to cause toxicity to sensitive test species actually associated with significant toxicity (chlorpyrifos and diuron).

All detected pesticide concentrations for Coalition monitoring conducted between April 2008 and October 2008 are summarized in **Table 19**. Pesticides were compared to relevant numeric and narrative water quality objectives, and to concentrations in USEPA's *Ecological Risk Assessment Aquatic Life Benchmark Table*[4].

- Aldicarb was detected in one sample. Aldicarb did not exceed the USEPA 1˚ MCL of 3 ug/L in this sample.
- Atrazine was detected in seven samples. Atrazine exceeded the California 1˚ MCL of 1 ug/L in one sample collected at Laguna Creek but did not exceed any of USEPA's *Aquatic Life Benchmarks* and was not linked with toxicity.
- Benomyl/Carbendazim was detected (below the quantitation limit) in three samples. Carbendazim is a breakdown product of benomyl. There is no adopted objective for benomyl or carbendazim.
- Carbofuran was detected in one sample. Carbofuran did not exceed the Basin Plan objective (.4 ug/L) in this sample.
- Chlorpyrifos was detected in three samples from two different sites. Chlorpyrifos exceeded the Basin Plan Amendment objective (.015 ug/L) in two of these samples. Chlorpyrifos was detected at concentrations with the potential to cause toxicity to sensitive invertebrate test species and was the likely cause of *Ceriodaphnia* toxicity observed in a sample collected at Lower Snake River at Nuestro Road on 8/18/08.
- DDE (p,p'), a breakdown product of the legacy organochlorine pesticide DDT, was detected in five samples from three different sites. All detected concentrations

[4] *Ecological Risk Assessment Aquatic Life Benchmark Table*, USEPA 2007. The table provides aquatic life benchmarks based on toxicity values derived from data in support of pesticide registrations. The aquatic life benchmarks are estimates of concentrations below which pesticides are *not* expected to have the potential for adverse effects on aquatic life. The benchmarks are not effect thresholds. The table can be found at http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm

exceeded the California Toxics Rule criterion (.00059 ug/L). The detected concentrations of this legacy pesticide are well below concentrations with the potential to be acutely toxic to aquatic organisms.

- Diazinon was detected in four samples from three different sites. Detected concentrations did not exceed the Basin Plan Amendment objective of 0.10 ug/L.
- Dieldrin was detected in one sample and exceeded the California Toxics Rule criterion (.00014 ug/L), but the exceedance was not associated with any observed sample toxicity.
- Dimethoate was detected in one sample. The detected concentration of this organophosphate insecticide was below levels with the potential to cause adverse effects to sensitive test species (21.5 ug/L), and the detection was not associated with any observed sample toxicity. There is no adopted objective for dimethoate.
- Diuron was detected in 13 samples from seven different sites. The detected concentration in a sample from Willow Slough Bypass exceeded levels with the potential to cause adverse effects to *Selanastrum* (2.4 ug/L), but was not associated with *Selenastrum* toxicity at this site. Diuron was associated with *Selenastrum* toxicity in a sample collected at Ulatis Creek at Brown Road on 4/21/08. There is no adopted objective for diuron.
- Glyphosate was detected in one sample. Glyphosate did not exceed the California 1˚ MCL of 700 ug/L in this sample and did not exceed any of USEPA's *Aquatic Life Benchmarks.*
- Malathion was detected in two samples from two sites. Malathion did not exceed the Basin Plan objective (0.1 ug/L) in either sample and was not associated with *Ceriodaphnia* toxicity.
- Methomyl was detected in two samples from two sites. The detected concentrations of this carbamate insecticide were below levels with the potential to cause adverse effects to the most sensitive test species (0.4 ug/L for chronic invertebrate tests). There is no adopted objective for methomyl.
- Prometon was detected in two samples from two sites. Detected concentrations were below levels with the potential to cause adverse effects to sensitive test species (~100 ug/L for *Selenastrum*). There is no adopted objective for prometon.
- Propazine, a triazine pesticide, was detected in one sample and was not associated with any significant toxicity. There is no adopted objective for propazine and no available data for toxicity to sensitive test organisms..
- Simazine was the most common of the pesticides detected (in 29 samples from ten different sites). Detected simazine was below levels with the potential to cause adverse effects on sensitive test species (36 ug/L) in all samples. Simazine did not exceed the California 1˚ MCL of 4 ug/L in any samples.

Table 19. Pesticides Detected in Coalition Monitoring, April 2008 – October 2008

Site ID	Date Sampled	Analyte	Result[1] (µg/L)	Water Quality Limits[2]	
LGNCR	05/21/2008	Aldicarb	1.5	3	USEPA 1˚ MCL
UCBRD	05/21/2008	Atrazine	.1225	1	CA 1˚ MCL
LAGAM	06/17/2008	Atrazine	.7017	1	CA 1˚ MCL
UCBRD	06/17/2008	Atrazine	.0383	1	CA 1˚ MCL
GIDLR	07/14/2008	Atrazine	.0163	1	CA 1˚ MCL
LAGAM	07/14/2008	Atrazine	2.6594	1	CA 1˚ MCL
LAGAM	08/18/2008	Atrazine	.0682	1	CA 1˚ MCL
UCBRD	08/18/2008	Atrazine	.0096	1	CA 1˚ MCL
WLKRC	04/23/2008	Benomyl/Carbendazim	DNQ .32	NA	NA
WLKRC	04/23/2008	Benomyl/Carbendazim	DNQ .29	NA	NA
WLKRC	05/21/2008	Benomyl/Carbendazim	DNQ .21	NA	NA
LSNKR	04/22/2008	Carbofuran	.19	0.4	BP
COONH	05/21/2008	Chlorpyrifos	.001	.015	BPA
LSNKR	07/15/2008	Chlorpyrifos	.0323	.015	BPA
LSNKR	08/19/2008	Chlorpyrifos	.0343	.015	BPA
WLSPL	04/21/2008	DDE(p,p')	.0039	.00059	CTR
COONH	05/21/2008	DDE(p,p')	.0013	.00059	CTR
UCBRD	05/21/2008	DDE(p,p')	.0115	.00059	CTR
WLSPL	05/21/2008	DDE(p,p')	.0082	.00059	CTR
COONH	06/18/2008	DDE(p,p')	DNQ .0011	.00059	CTR
SSLIB	04/21/2008	Diazinon	.0042	0.1	BPA
FRSHC	04/22/2008	Diazinon	.0174	0.1	BPA
FRSHC	05/21/2008	Diazinon	.0197	0.1	BPA
LRLNC	05/21/2008	Diazinon	.0062	0.1	BPA
FRSHC	04/22/2008	Dieldrin	.0043	.00014	CTR
GIDLR	04/21/2008	Dimethoate	.0244	NA	NA
SSLIB	04/21/2008	Diuron	DNQ .21	NA	NA
UCBRD	04/21/2008	Diuron	1.5	NA	NA
WLSPL	04/21/2008	Diuron	5.8	NA	NA
LSNKR	04/22/2008	Diuron	DNQ .25	NA	NA
WLKRC	04/23/2008	Diuron	.69	NA	NA
WLKRC	04/23/2008	Diuron	.67	NA	NA
COLDR	04/29/2008	Diuron	DNQ .22	NA	NA
SSKNK	04/29/2008	Diuron	.46	NA	NA
UCBRD	05/19/2008	Diuron	DNQ .21	NA	NA
WLSPL	05/19/2008	Diuron	1.4	NA	NA
WLSPL	06/17/2008	Diuron	DNQ .24	NA	NA
UCBRD	07/14/2008	Diuron	DNQ .26	NA	NA
WLSPL	07/14/2008	Diuron	DNQ .25	NA	NA
GIDLR	06/17/2008	Glyphosate	7.5	700	CA 1˚ MCL
WLSPL	04/21/2008	Malathion	.0475	.1	BP

Site ID	Date Sampled	Analyte	Result[1] (µg/L)	Water Quality Limits[2]	
COYTR	04/23/2008	Malathion	.0124	.1	BP
LRLNC	05/20/2008	Methomyl	.08	NA	NA
UCBRD	08/18/2008	Methomyl	.2	NA	NA
CCBRW	04/21/2008	Prometon	.0055	NA	NA
SSKNK	04/29/2008	Prometon	.0053	NA	NA
LAGAM	07/14/2008	Propazine	.0216	NA	NA
CCBRW	04/21/2008	Simazine	.0066	4	CA 1˚ MCL
LAGAM	04/21/2008	Simazine	.0153	4	CA 1˚ MCL
SSLIB	04/21/2008	Simazine	.0204	4	CA 1˚ MCL
UCBRD	04/21/2008	Simazine	.0217	4	CA 1˚ MCL
UCBRD	04/21/2008	Simazine	.0196	4	CA 1˚ MCL
WLSPL	04/21/2008	Simazine	.0138	4	CA 1˚ MCL
LSNKR	04/22/2008	Simazine	.0306	4	CA 1˚ MCL
CCCPY	04/23/2008	Simazine	.0106	4	CA 1˚ MCL
WLKRC	04/23/2008	Simazine	.1161	4	CA 1˚ MCL
COLDR	04/29/2008	Simazine	.0183	4	CA 1˚ MCL
SSKNK	04/29/2008	Simazine	.0149	4	CA 1˚ MCL
COLDR	05/13/2008	Simazine	.0127	4	CA 1˚ MCL
SSKNK	05/13/2008	Simazine	.0205	4	CA 1˚ MCL
CCCPY	05/21/2008	Simazine	.0264	4	CA 1˚ MCL
LSNKR	05/21/2008	Simazine	.0116	4	CA 1˚ MCL
SSLIB	05/21/2008	Simazine	.011	4	CA 1˚ MCL
UCBRD	05/21/2008	Simazine	.0278	4	CA 1˚ MCL
WLKRC	05/21/2008	Simazine	.0235	4	CA 1˚ MCL
WLSPL	05/21/2008	Simazine	.0214	4	CA 1˚ MCL
COLDR	06/03/2008	Simazine	.009	4	CA 1˚ MCL
SSKNK	06/03/2008	Simazine	.0136	4	CA 1˚ MCL
UCBRD	07/14/2008	Simazine	.0134	4	CA 1˚ MCL
WLSPL	07/14/2008	Simazine	.0094	4	CA 1˚ MCL
LSNKR	07/15/2008	Simazine	.0155	4	CA 1˚ MCL
CCCPY	07/16/2008	Simazine	.0191	4	CA 1˚ MCL
UCBRD	08/18/2008	Simazine	.096	4	CA 1˚ MCL
WLSPL	08/18/2008	Simazine	.0085	4	CA 1˚ MCL
CCCPY	08/20/2008	Simazine	.0166	4	CA 1˚ MCL
UCBRD	09/15/2008	Simazine	.0114	4	CA 1˚ MCL

1. "DNQ" (Detected Not Quantified) indicates that the detected value was greater than the method detection limit (MDL) but less than the quantitation or reporting limit (QL); "E" = Estimated value
2. Water Quality Objective Basis: BP = Central Valley Basin Plan; BPA = BPA; CTR = California Toxics Rule; "CA 1˚ MCL" indicates a California Primary Maximum Contaminant Limit for drinking water (adopted by reference in the Basin Plan); "NA" indicates no applicable objective available.

Other Coalition-Monitored Water Quality Parameters

Exceedances of adopted Basin Plan objectives and advisory limits were observed for boron, conductivity, dissolved oxygen, *E. coli*, pH, and total dissolved solids (TDS) (**Table 21**).

Dissolved Oxygen

During the 2008 Irrigation Season, dissolved oxygen was measured in 133 samples from 25 Coalition sites. Dissolved oxygen concentrations were below the Basin Plan lower limit of 5.0 mg/L for waterbodies with a WARM designated beneficial use in 11 samples from four sites and below the Basin Plan lower limit of 7.0 mg/L for waterbodies with a COLD designated beneficial use in an additional five samples from four sites. Dissolved oxygen exceedances were primarily due to low flows, stagnant conditions, and/or extensive submerged aquatic vegetation. The low flows and stagnant conditions have the potential to limit oxygen production by instream algae and also to trap organic particulates that contribute to instream oxygen consumption. In most cases, it was determined that the conditions were typical for irrigation season at these sites.

pH

During the 2008 Irrigation Season, pH was measured in 144 samples from 25 Coalition sites. pH exceeded the Basin Plan maximum of 8.5 Standard Units (-log[H+]) in six Coalition samples collected from three different sites (Fall River at Fall River Ranch Bridge; Middle Fork Feather River above Grizzly Creek Confluence; and Pit River at Pittville).

The Basin Plan limit for pH is intended to be assessed based on "…*an appropriate averaging period that will support beneficial uses*" (CVRWQCB 1995). This parameter typically exhibits significant natural diurnal variation over 24 hours in natural waters with daily fluctuations controlled principally by photosynthesis, rate of respiration, and buffering capacity of the water. These processes are controlled by light and nutrient availability, concentrations of organic matter, and temperature. These factors combine to cause increasing pH during daylight hours and decreasing pH at night. Diurnal variations in winter are typically smaller because less light is available and there are lower temperatures and higher flows. Irrigation return flows may influence this variation primarily by increasing or decreasing in-stream temperatures or by increasing available nutrients or organic matter.

In general, the reason for these pH exceedances was not immediately obvious or easily determined. Follow-up results for Pit River indicated a weak diurnal variation in pH that persisted downstream to Canby. The elevated pHs appear to be within normal range of ambient pH for these two sites. No follow-up sampling was conducted for the Fall River site. After consultation and disuccsion of the pH data with Water Board ILRP staff, it was agreed that follow-up sampling was not needed for the observed pH exceedances in these drainages. The Middle Fork Feather River site had no measurable flow at the regular and follow-up sampling events, and submerged aquatic vegetation and algae were observed. The marginal pH exceedance at this site was likely due primarily to instream algal respiration, cuased in part by low flows and stagnant conditions. MFFGR also has a relatively high pH (the average pH was 8.8 for 2007).

E. coli bacteria

E. coli bacteria were monitored in 115 samples from 26 sites. Coliform bacteria numbers exceeded the single sample maximum objectives for *E. coli* (235 MPN/100mL) in 18 samples

from ten different Coalition locations. The Basin Plan objectives are intended to protect contact recreational uses where ingestion of water is probable (e.g., swimming). Agricultural lands commonly support a large variety (and sometimes very large numbers) of birds and other wildlife. These avian and wildlife resources are expected to be significant sources of *E. coli* and other bacteria in agricultural runoff and irrigation return flows. Other sources include, but are not limited to cattle, horses, and septic systems.

Conductivity and Total Dissolved Solids

Conductivity was monitored in 134 samples from 25 Coalition sites. Conductivity exceeded the California recommended 2˚ MCL (900 uS/cm) for drinking water in four samples and the unadopted UN Agricultural Goal (700 uS/cm) in a total of eight samples collected from two different sites (Shag Slough at Liberty Island Bridge and Ulatis Creek at Brown Road). Seven of the eight exceedances were observed in samples collected from Ulatis Creek at Brown Road.

Total dissolved solids (TDS) were monitored in six samples from one Coalition site. TDS exceeded the unadopted UN Agricultural Supply Goal (450 mg/L) and the California recommended 2˚ MCL (500 mg/L) for drinking water in 5 samples collected from one site, Ulatis Creek at Brown Road. All five samples also exceeded the conductivity objective. The conductivity and TDS objectives are intended to apply to treated drinking water and are based on aesthetic acceptance by consumers of the water.

Trace Metals

Total and dissolved trace metals required for *ILRP* monitoring included arsenic, boron, cadmium, copper, lead, nickel, selenium, and zinc. Trace metals were monitored in 200 samples collected from 18 Coalition sites. Total boron exceeded the unadopted UN Agricultural Supply Goal (700 ug/L) in six samples from Cache Creek at Capay Diversion Dam and six samples from Willow Slough Bypass at Pole Line (both in the Solano/Yolo subwatershed). Boron is naturally high in the soil and groundwater in this drainage. Boron exceedances are being evaluated and addressed in the Coalition's Management Plan. There were no exceedances of objectives for arsenic, cadmium, copper, lead, nickel, selenium, or zinc.

Nutrients

Nutrients monitored during the 2008 Irrigation Season included nitrate, nitrite, total Kjeldahl nitrogen (TKN), ammonia, total phosphorus, and dissolved orthophosphate. Nutrients were monitored in 126 samples at 21 different Coalition sites. There were no exceedances for nutrients. Ammonia concentrations were typically below quantitation limits and did not exceed the temperature- and pH-dependent national water quality criterion for this parameter in any sample. There are no water quality objectives (adopted or unadopted) for TKN, total phosphorus, or orthophosphate.

Table 20. Other Physical, Chemical, and Microbiological Parameters Observed to Exceed Numeric Objectives in Coalition Monitoring, 2008 Irrigation Season

Site ID	Sample Date	Analyte	Units	Result	WQO[1]	WQO Basis[2]	Mgt Plan[3]
LAGAM	4/21/08	*E. Coli*	MPN/100mL	2000	235	BPA	(5)
SSLIB	4/21/08	Conductivity	uS/cm	732	900, 700	BPN, A&W	YES
UCBRD	4/21/08	Conductivity	uS/cm	1026	900, 700	BPN, A&W	YES
UCBRD	4/21/08	TDS	mg/L	630	450	A&W	YES
WLSPL	4/21/08	Boron	ug/L	1100	700	A&W	YES
CCCPY	4/23/08	Boron	ug/L	930	700	A&W	YES
COYTR	4/23/08	Dissolved Oxygen	mg/L	4.29	7 (COLD), 5 (WARM)	BP	(5)
WLKRC	4/23/08	*E. Coli*	MPN/100mL	1100	235	BPA	(5)
UCBRD	4/30/08[(6)]	Conductivity	uS/cm	929	700	A&W	YES
LAGAM	5/19/08	*E. Coli*	MPN/100mL	260	235	BPA	(5)
SSLIB	5/19/08	*E. Coli*	MPN/100mL	1300	235	BPA	YES
UCBRD	5/19/08	Conductivity	uS/cm	767	900, 700	BPN, A&W	YES
UCBRD	5/19/08	*E. Coli*	MPN/100mL	370	235	BPA	YES
WLSPL	5/19/08	Boron	ug/L	1400	700	A&W	YES
FRSHC	5/20/08	*E. Coli*	MPN/100mL	580	235	BPA	(5)
LSNKR	5/20/08	*E. Coli*	MPN/100mL	370	235	BPA	(5)
CCCPY	5/21/08	Boron	ug/L	940	700	A&W	YES
COYTR	5/21/08	Dissolved Oxygen	mg/L	2.02	7 (COLD), 5 (WARM)	BP	(5)
LGNCR	5/21/08	*E. Coli*	MPN/100mL	310	235	BPA	(5)
WLKRC	5/21/08	Dissolved Oxygen	mg/L	4.22	7 (COLD), 5 (WARM)	BP	(5)
WLKRC	5/21/08	*E. Coli*	MPN/100mL	390	235	BPA	(5)
LAGAM	6/17/08	*E. Coli*	MPN/100mL	> 2400	235	BPA	(5)
UCBRD	6/17/08	TDS	mg/L	680	450	A&W	YES
UCBRD	6/17/08[(7)]	TDS	mg/L	690	450	A&W	—
WLSPL	6/17/08	Boron	ug/L	1400	700	A&W	YES
UCBRD	6/17/08	Conductivity	uS/cm	1102	900, 700	BPN, A&W	YES
LAGAM	6/17/08	Dissolved Oxygen	mg/L	3.32	7 (COLD), 5 (WARM)	BP	(5)
CCCPY	6/19/08	Boron	ug/L	970	700	A&W	YES
FRSHC	6/19/08	*E. Coli*	MPN/100mL	410	235	BPA	(5)
WLKRC	6/19/08	*E. Coli*	MPN/100mL	260	235	BPA	(5)
COYTR	6/19/08	Dissolved Oxygen	mg/L	1.36	7 (COLD), 5 (WARM)	BP	(5)
WLKRC	6/19/08	Dissolved Oxygen	mg/L	1.24	7 (COLD), 5 (WARM)	BP	(5)
FRRRB	6/27/08	pH	-log[H+]	8.8	6.5-8.5	BP	(5)
PRPIT	6/27/08	pH	-log[H+]	8.6	6.5-8.5	BP	(5)
MFFGR	7/8/08	pH	$-\log[H^+]$	9.1	6.5-8.5	BP	(5)
UCBRD	7/14/08	Conductivity	uS/cm	1,406	900, 700	BPN, A&W	YES
UCBRD	7/14/08	TDS	mg/L	670	450	A&W	YES
WLSPL	7/14/08	Boron	ug/L	1200	700	A&W	YES
CCCPY	7/16/08	Boron	ug/L	1000	700	A&W	YES

Site ID	Sample Date	Analyte	Units	Result	WQO[1]	WQO Basis[2]	Mgt Plan[3]
COYTR	7/16/08	Dissolved Oxygen	mg/L	0.83	7 (COLD), 5 (WARM)	BP	(5)
COYTR	7/16/08	*E. Coli*	MPN/100mL	290	235	BPA	NO
WLKRC	7/16/08	Dissolved Oxygen	mg/L	0.39	7 (COLD), 5 (WARM)	BP	(5)
FRRRB	7/28/08	pH	-log[H^+]	8.70	6.5-8.5	BP	(5)
MFFGR	8/5/08	PH	-log[H+]	8.9	6.5-8.5	BP	(5)
LAGAM	8/18/08	Dissolved Oxygen	mg/L	5.59	7 (COLD), 5 (WARM)	BP	(5)
UCBRD	8/18/08	Conductivity	uS/cm	874	900, 700	BPN, A&W	YES
UCBRD	8/18/08	TDS	mg/L	510	450	A&W	YES
WLSPL	8/18/08	Boron	ug/L	1700	700	A&W	YES
WLSPL	8/18/08	*E. Coli*	MPN/100mL	690	235	BPA	(5)
FRSHC	8/19/08	*E. Coli*	MPN/100mL	490	235	BPA	NO
LSNKR	8/19/08	*E. Coli*	MPN/100mL	410	235	BPA	(5)
NRTCN	8/19/08	*E. Coli*	MPN/100mL	260	235	BPA	(5)
CCCPY	8/20/08	Boron	ug/L	1000	700	A&W	YES
CCCPY	8/20/08[(6)]	Dissolved Oxygen	mg/L	6.86	7 (COLD), 5 (WARM)	BP	(5)
COYTR	8/20/08	Dissolved Oxygen	mg/L	3.6	7 (COLD), 5 (WARM)	BP	(5)
WLKRC	8/20/08	Dissolved Oxygen	mg/L	6.01	7 (COLD), 5 (WARM)	BP	(5)
PRCAN	8/26/08	Dissolved Oxygen	mg/L	6	7 (COLD), 5 (WARM)	BP	(5)
PRPIT	8/26/08	Dissolved Oxygen	mg/L	6	7 (COLD), 5 (WARM)	BP	(5)
COLDR	8/26/08	Dissolved Oxygen	mg/L	5.59	7 (COLD), 5 (WARM)	BP	(5)
MFFGR	9/2/08	pH	-log[H+]	9.49	6.5-8.5	BP	(5)
SSKNK	9/3/08	Dissolved Oxygen	mg/L	6.65	7 (COLD), 5 (WARM)	BP	NO
UCBRD	9/15/08	Conductivity	uS/cm	885	900, 700	BPN, A&W	YES
UCBRD	9/15/08	TDS	mg/L	520	450	A&W	YES
WSLPL	9/15/08	Boron	ug/L	1300	700	A&W	YES
WSLPL	9/15/08	*E. Coli*	MPN/100mL	1000	235	BPA	(5)
LAGAM	9/16/08	Dissolved Oxygen	mg/L	5.22	7 (COLD), 5 (WARM)	BP	(5)
COLDR	9/16/08 13:55	Dissolved Oxygen	mg/L	6.49	7 (COLD), 5 (WARM)	BP	(5)
CCCPY	9/18/08	Boron	ug/L	1300	700	A&W	YES
COYTR	9/18/08	Dissolved Oxygen	mg/L	2.03	7 (COLD), 5 (WARM)	BP	(5)

Notes:
NA = Not applicable

1. Water Quality Objective or Narrative Interpretation Limit
2. **WQO Basis:** Sources of Adopted Objectives: BP = Central Valley Basin Plan; CTR = California Toxics Rule; Sources of unadopted limits used to interpret Basin Plan narrative objectives: BPA = Basin Plan Amendment (unapproved); A&W = UN Agricultural Supply Goal (Ayers and Westcott, 1986); BPN = other narrative interpretation limits, including 1° MCLs, recommended 2° MCLs, and advisory limits.
3. Indicates whether sites and parameter are currently being addressed by an ongoing management plan, study, or TMDL.
4. Chlorinated pesticides are regulated under a narrative provision of the Basin Plan, which states that "…chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer." The required accuracy limits approved specifically for the ILRP MRP are 0.02 ug/l for DDD, and 0.01 ug/L for DDE and DDT. Concentrations did not exceed these MRP limits.
5. Management Plan submitted December 1, 2008
6. Not reported previously as an exceedance
7. Field duplicate; not counted as separate exceedance

Management Practices and Actions Taken

RESPONSE TO EXCEEDANCES

To address specific water quality exceedances, the Coalition and its partners developed two management plans prior to 2008, the *Diazinon Runoff Management Plan for Orchard Growers in the Sacramento Valley* and the *Yolo Technical Report*. The *Yolo Technical Report* was incorporated into a larger management plan for the Sacramento Valley, *Water Quality Management Plan,* submitted to the Regional Board on December 1, 2008. The Coalition's Management Plan is undergoing Regional Board review. The Coalition also developed a *Landowner Outreach and Management Practices Implementation Communications Process for Monitoring Results (Management Practices Process)* to address exceedances.

Diazinon Management Plan

The following conclusions can be made based on the results of the three years of TMDL compliance monitoring and management completed to date.

Two of the thirty-five samples collected at the five compliance monitoring locations in 2008 exceeded adopted concentration-based TMDL objectives for diazinon and load-based objectives for diazinon and chlorpyrifos, as well as the USEPA national criterion. The average diazinon concentration for samples collected February 21-24 at Colusa Basin Drain (1.29 ug/L) also exceeded the adopted TMDL 4-day average Basin Plan objective for diazinon (0.1 µg/L), as well as the Load Allocation for the sum of diazinon and chlorpyrifos. The exceedances occurring at Colusa Basin Drain on February 21 and 22, 2008 were more than two weeks after the normal period when dormant orchard applications are made in the Sacramento Valley.

In spite of this success, the exceedances observed in 2008 indicated a need to examine other potential uses beyond dormant orchard applications. The Coalition performed the following actions in response to the exceedances:

- Obtained a list of growers who applied diazinon in the Colusa Basin Drain watershed area;
- Determined that diazinon applications were made in the Colusa Basin watershed to a limited number of direct-seeded tomato fields. These were soil applications of diazinon made at planting in mid-Feburary. These plantings typically occur mid-to late February in years when dry soil conditions allow such early planting (as in February 2008).
- Reviewed the label and discussed the applications with the diazinon registrant and County Agricultural Commissioners to determine that the applications were in fact made according to the current label;
- Determined that there were no applications to orchards in the Colusa Basin watershed from mid-February onward.

After analyzing the above information, Coalition representatives then:

- Met with the growers to review management practices used when applying diazinon to canning tomatoes;

- Determined that the three growers applied the diazinon in accordance with the label restrictions and DPR dormant spray regulations (even though such applications do not apply to tomatoes);
- Discussed practices that could be used in tomato planting that could proactively prevent future diazinon runoff after tomato direct seeding;
- Committed to remind growers prior to planting in 2009 about the coalition discussions and a review of management practices to implement.

After reviewing the timing of diazinon application to the above tomato fields, the timing of the rain event and monitoring, when the diazinon exceedances observed, and the distance to the monitoring location from the treated tomato fields, it was determined that the three growers identified by the Agricultural Commissioners to have used diazinon were not the likely source of the exceedance. The basis of this conclusion were as follows:

- The fields where diazinon was applied were at least 15 miles from the coalition sampling site;
- According to the grower's observations, runoff from the treated fields did not occur for at least 24 to 36 hours after the storm began due to extremely dry soil conditions in the early planted fields (which allowed planting in the field in the first place);
- The peak diazinon concentrations occurred soon after the storm event began and tapered off over the next 24 to 36 hours.

The Coalition and its Subwatershed groups continue to promote using management practices to reduce diazinon runoff after dormant orchard sprays. The outreach presentations prior to dormant season include information on the diazinon label changes, the finalized diazinon TMDL and the new dormant orchard spray regulations. Also included is information on available BMP options to protect surface waters from potential impacts of dormant season runoff of alternatives to diazinon, specifically pyrethroid insecticides.

Although exceedances were observed in 2008, the majority of the 95 samples collected from 2006 through 2008 during the normal dormant orchard spray period of December 20 through February 1 and all of the 21 concentrations estimated at the Sacramento River at Verona were in compliance with the TMDL objectives. The overall results indicate that the combination of changes in diazinon dormant spray use patterns, changes in management practices, modifications to labeling and the Department of Pesticide Regulation "Dormant Spray Regulations" have been successful in reducing instream ambient diazinon and chlorpyrifos concentrations and loads below the historically observed levels that caused these waters to be listed as impaired.

LANDOWNER OUTREACH EFFORTS

The Coalition and its subwatersheds, working with the Coalition for Urban/Rural Environmental Stewardship (CURES), stand committed to working with the Regional Water Board and its staff to implement the *Management Practices Process* to address water quality problems identified in the Sacramento Valley. The strategic approach taken by the Coalition is to notify the subwatershed landowners, farm operators, and/or wetland managers about the cause(s) of toxicity and/or exceedance(s) of water quality standards. Notifications are targeted at growers who operate directly adjacent to or within close proximity to the waterway. The broader outreach program, which includes both grower meetings and the notifications distributed through direct

mailings, encourages the adoption of BMPs and modification of the uses of specific farm and wetland inputs to prevent movement of a constituent of concern into Sacramento Valley surface waters.

Targeted Outreach Efforts

The Coalition's targeted outreach approach is to focus on the growers with fields directly adjacent to or near the actual waterway of concern. To identify those landowners, which the Coalition describes as operating in high priority lands, the Coalition starts with a topographic map and overlays a parcel map to identify the assessor parcel numbers and, subsequently, the owner. From the list of assessor parcel numbers, the Coalition identifies its members and mails to them an advisory notice along with information on how to address the specific exceedances using BMPs. In targeted areas, management practice surveys are and will continue to be distributed.

General Outreach Efforts

Highlights of outreach efforts conducted by the Coalition and its partners for specific subwatersheds between June 2008 and December 2007 are listed in **Table 21**.

Table 21. Summary of Landowner Outreach Efforts, April 2008 – October 2008

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
All	6/12/2008	SVWQC	Coalition Meeting	Yuba City	35	N
All	9/9/2008	SVWQC	Subwatershed Coordinator Meeting	Conference Call	12	N
All	9/22/2008	SVWQC	Newsletter	Throughout Membership Area	290	N
All	10/1/2008	SVWQC	Coalition Meeting	Woodland	~35	N
All	11/15/2008	SVWQC	Subwatershed Coordinator Meeting	Conference Call	10	N
All	11/26/2008	SVWQC	Newsletter	Throughout Membership Area	290	Newsletter
Colusa-Glenn	12/19/2007[(1)]	Colusa-Glenn Subwatershed Program	Annual Meeting Information	Willows City Council Chambers, City of Willows	16	Agenda & Minutes
Colusa-Glenn	1/16/2008[(1)]	Colusa-Glenn Subwatershed Program	Chlorpyrifos exceedances, management plan, BMPs	Monday Afternoon Club, City of Willows	30	Exceedance notice
Colusa-Glenn	2/29/2008[(1)]	Colusa, Glenn, and Butte County Community Members	Notice of public workshops and CEQA scoping meetings	Chico Enterprise Record, Tri Counties Newspaper, Sacramento Valley Mirror	Colusa, Glenn and Butte Counties	Press Release
Colusa-Glenn	3/29/2008[(1)]	Glenn County Community Members	Program information	Best of the West, Glenn County Fairgrounds, City of Orland	1,500	None
Colusa-Glenn	5/16/2008	Colusa County Farm Supply	Use of Diazinon	Colusa County	8	Discussion only
Colusa-Glenn	5/21/2008	Colusa-Glenn Subwatershed Program	Use of Chlorpyrifos, follow-up from 1/16/2008 workshop		135	Letter
Colusa-Glenn	5/21/2008	Murdock Elementary School (4th Grade), Teachers, & Volunteer Adults	"Watersheds—they are important!" (Water quality demonstration)	Mudd Ranch	120	None
Colusa-Glenn	6/5/2008	Colusa, Glenn, and Butte County Community Members	Deadline to join a coalition	Chico Enterprise Record, Tri Counties Newspaper, Sacramento Valley Mirror	Colusa, Glenn and Butte Counties	Press Release
Colusa-Glenn	6/6/2008	Natural Resources Conservation Service (NRCS)	Upper Stony Creek Watershed - Support for Rapid Watershed Assessment Project	State NRCS Office	1	Letter of Support

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
Colusa-Glenn	6/25/2008	Colusa-Glenn Subwatershed Program	Summary of exceedance and communication reports; SVWQC meetings; education and outreach update; etc.	Willows USDA Service Center, City of Willows	11	Agenda & Minutes
Colusa-Glenn	7/21/2008	Glenn County Resource Conservation District	General ILRP information	Willows USDA Service Center, City of Willows	35	None
Colusa-Glenn	7/29/2008	Colusa-Glenn Subwatershed Program	Use of Chlorpyrifos, follow-up from 1/16/2008 workshop, Notice #2		135	Letter, Lorsban Handout
Colusa-Glenn	8/8/2008	Glenn County Resource Conservation District	General ILRP information	Divide Ranch, Elk Creek	65	None
Colusa-Glenn	8/18/2008	Glenn County Farm Bureau	Use of Chlorpyrifos, follow-up from 1/16/2008 workshop	Glenn County Farm Bureau, City of Orland	800	Letter
Colusa-Glenn	8/19/2008	Colusa-Glenn Subwatershed Program	Diazinon Exceedance to Tomato Growers; label requirements; weather; BMPs; sampling data; alternative products; etc.	Colusa County	8	Notes
Colusa-Glenn	9/25/2008	Glenn County Resource Conservation District	FARM DAY: Water quality	Glenn County Farm Bureau, City of Orland (fairgrounds)	500	News Article
Colusa-Glenn	10/1/2008	Colusa-Glenn Subwatershed Program	Press Release: Director nominations; board structure; ILRP	The Sacramento Valley Mirror; Tri Counties Newspaper; Chico Enterprise Record; Family Water Alliance; Glenn County Farm Bureau	Unknown	Press Release
Colusa-Glenn	11/13/2008	Colusa-Glenn Subwatershed Program	Summary of exceedance and communication reports; MOA; Management Plan; education and outreach update; Prop 84 funding opportunity; etc.	Colusa County Farm Bureau, Colusa	7	Agenda & Minutes
Colusa-Glenn	12/4/2008	Colusa-Glenn Subwatershed Program	Newsletter: You are a member…now what? - Required Management Plans Defined; Grower Meetings; Annual Meeting; 2007/2008 Monitoring Summary; 2009 Monitoring Sample Locations; BMP Evaluation of Freshwater Creek; 2009 Director Elections; contact information	Colusa and Glenn Counties	1,855	Newsletter

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
Colusa-Glenn	12/9/2008	Colusa County Agricultural Department	Pesticide program changes and issues; worker safety regulations; fungicide use for stripe rust control on wheat; electronic reporting; ILRP and Coalition activities; rice herbicide for 2009; Regional Water Board presentation; BMPs; Pesticides	Colusa Industrial Conference Room, Colusa	63	Agenda
Colusa-Glenn	12/9/2008	CURES	Colusa County Agricultural Commissioner grower CE day - Review of water quality BMPs for chlorpyrifos and pyrethroids	Colusa	55	N
Colusa-Glenn	12/10/2008	Colusa-Glenn Subwatershed Program	Water quality monitoring; partnership opportunities with Sacramento National Wildlife Refuge (NWR); discussion of scheduling tour of NWR	Email	2	None
Colusa-Glenn	12/11/2008	Glenn County Agricultural Department	Regulatory update; Irrigated Lands Regulatory Program: Grower concerns due to pesticide applications; ILRP outreach and planning update; DOT regulations for hazardous material transportation (pesticides); respirator changes concerning growers; CUPA update; stationary diesel ATCM and Carl Moyer Program updates	Ord Bend Community Hall, Ord Bend	98	Agenda
Colusa-Glenn	12/15/2008	Colusa-Glenn Subwatershed Program	Annual Meeting: Introductions; review of organization; financial report; monitoring results for 2008; expectations of members for 2009; management plan update; Freshwater Creek and Walker Creek Pilot Programs (MOU); schedule next meeting	Colusa County Farm Bureau, Colusa	12	Agenda
Colusa-Glenn	Monthly	Glenn County Farm Bureau	Program elements; monitoring results/exceedances; Q&A	Glenn County Farm Bureau, City of Orland	20-30 each month	Verbal reports only
Colusa-Glenn	Monthly	Glenn County Resource Conservation District	Program elements; monitoring results/exceedances; Q&A	Willows USDA Service Center, City of Willows	10-20 each month	Verbal reports mainly, agenda attached when appropriate
El Dorado	6/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	18 permit renewals	N
El Dorado	6/5/2008	UCCE	Grape IPM	Shingle Springs	122	N
El Dorado	7/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	7 permit renewals	N

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
El Dorado	8/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	13 permit renewals	N
El Dorado	9/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	7 permit renewals	N
El Dorado	10/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	1 permit renewal	N
El Dorado	11/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	2 permit renewals	N
El Dorado	12/2008	El Dorado Co. Ag Dept	Pesticide Mix, Loading & Application BMPs	Ag Office	23 permit renewals	N
El Dorado	06/2008-08/2008	UCCE	Sprayer calibration	Various locations, one-on-one with growers	5	N
El Dorado	Fall 2008	El Dorado County Agricultural Water Quality Management Corporation (EDCAWQMC)	Newsletter	n/a	450 distribution	Y
Lake-Napa	1/22/2008[1]	PCWG	General Membership meeting	Pope Valley Farm Center	35	Y
Lake-Napa	5/2/2008	PCWG	Presentation at Napa Co. Watershed Symposium	Copia, Napa, CA	85	Y
Lake-Napa	6/2008	Lake County Farm Bureau	*E. coli* Study	Lake County News & Reviews	893	N
Lake-Napa	6/1/2008	Lake County Farm Bureau	DDT from the Old Days	Lake County News & Reviews	893	N
Lake-Napa	6/1/2008	Lake County Farm Bureau	Irrigated Lands Program Gets New Leader	Lake County News & Reviews	893	N
Lake-Napa	7/9/2008	PCWG	PCWG Steering Committee Planning & Reporting meeting	Napa Co. Farm Bureau	7	N
Lake-Napa	8/11/2008	Lake County Farm Bureau	New Monitoring Strategy	Lake County News & Reviews	852	N
Lake-Napa	8/11/2008	Lake County Farm Bureau	Local CRMP Meetings	Lake County News & Reviews	852	N
Lake-Napa	8/11/2008	Lake County Farm Bureau	Regional Board ILRP	Lake County News & Reviews	852	N
Lake-Napa	8/13/2008	Lake County Department of Water Resources	Clear Lake TMDL Meeting	Lake County Court House	Not tracked	N

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
Lake-Napa	10/1/2008	SVWQC	Coalition Meeting	Yolo County Farm Bureau	Not tracked	N
Lake-Napa	10/2/2008	Lake County Farm Bureau	Semi-Annual Monitoring Report	Lake County News & Reviews	864	N
Lake-Napa	10/8/2008	Lake County Farm Bureau	BOD Meeting/Watershed Group	Lake County Farm Bureau	23	N
Lake-Napa	10/21/2008	Lake County Department of Water Resources	Board Of Supervisors; TMDL	Lake County Court House	Not tracked	N
Lake-Napa	10/27/2008	PCWG	PCWG Steering Committee Planning & Reporting meeting	Napa Co. Farm Bureau	9	N
Lake-Napa	11/12/2008	Lake County Farm Bureau	BOD Meeting/Watershed Meeting	Lake County Farm Bureau	17	N
Lake-Napa	11/12/2008	Lake County Farm Bureau	BOD Meeting/Watershed Financial	Lake County Farm Bureau	17	N
Lake-Napa	11/17/2008	Lake County Irrigated Lands Program	Watershed Members Meeting	Lake County Fair Grounds	26	N
NECWA (Pit River)	6/17/2008	NECWA	Board Meeting - Open to the membership	McArthur, CA	7	Y
NECWA (Pit River)	8/11/2008	NECWA	Management Practices Committee Meeting	McArthur, CA	8	N
NECWA (Pit River)	9/30/2008	NECWA	Board Meeting - Open to the membership	McArthur, CA	10	Y
NECWA (Pit River)	11/12/2008	NECWA	Board Meeting - Open to the membership	McArthur, CA	10	Y
NECWA (Pit River)	12/18/2008	NECWA	Board Meeting - Open to the membership	McArthur, CA	Not tracked	N
Placer-Nevada-So. Sutter- No. Sacramento	6/18/2008	PNSSNS	Nevada Co. Water Monitoring	Nevada Irrigation District	18	Y
Placer-Nevada-So. Sutter- No. Sacramento	9/26/2008	PNSSNS Subwatershed	Board of Directors Meeting; *E. coli;* membership; lawsuits	Lincoln, CA	Not tracked	N
Sacramento-Amador	6/19/2008	Amador RCD	Irrigated Lands Program	Amador Co.	8	N

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
Sacramento-Amador	7/17/2008	Amador RCD	Irrigated Lands Program	Amador Co.	7	N
Sacramento-Amador	8/21/2008	Amador RCD	Irrigated Lands Program	Amador Co.	10	Agenda
Sacramento-Amador	9/18/2008	Amador RCD	Irrigated Lands Program	Amador Co.	9	Agenda
Sacramento-Amador	10/16/2008	Amador RCD	Irrigated Lands Program	Amador Co.	9	Agenda
Sacramento-Amador	11/20/2008	Amador RCD	Irrigated Lands Program	Amador Co.	8	Agenda
Shasta-Tehama	9/29/2008	Bella Vista Water Users Group	Program Status	Bella Vista	50-60	N
Shasta-Tehama	Monthly	STWEC Board Meeting	Program Status	Cottonwood, Red Bluff	10-15	N
Shasta-Tehama	Monthly	Cow Creek Watershed Management Group	Program Status	Palo Cedro	10-15	N
Shasta-Tehama	Monthly	Cottonwood Creek Watershed Group	Program Status	Cottonwood	10-15	N
Shasta-Tehama	Monthly	Shasta County Cattlemen	Program Status	Redding	15-20	N
Solano-Yolo	10/22/2008	Dixon Solano Water Quality Coalition	UPDATE for Coalition members	Sent with membership bills by mail	675	Y
Solano-Yolo	12/1/2008	Dixon Solano Water Quality Coalition	Program Update for Dixon RCD members	Sent with ditch fee billing by mail	250	Y
Solano-Yolo	12/1/2008	Dixon Solano Water Quality Coalition	Description of the Irrigated Lands Program	UC Davis - "Water & Society" Course	20	N
Solano-Yolo	12/11/2008	Dixon Solano Water Quality Coalition	Monitoring Results & Program Requirements presentation for Solano growers	Solano County Ag Commissioner's Pesticide Applicator Training	45	Y
Solano-Yolo	2/2008[(2)]	Yolo County Farm Bureau Education Corporation, Subwatershed Program	Irrigated Lands Waiver Newsletter Volume 2 Issue 4	Woodland	1670 Distributed	N
Solano-Yolo	6/2008	Yolo County Farm Bureau Education Corporation, Subwatershed Program	Irrigated Lands Waiver Newsletter Volume 2 Issue 5	Woodland	1670 Distributed	N

Subwatershed	Date	Organization	Topics/Exceedances Discussed	Location	# of People in Attendance/on Distribution List	Document Enclosed
Solano-Yolo	8/2008	Yolo County Farm Bureau Education Corporation, Subwatershed Program	Hold Harmless Agreement Forms requested from those not in the file	Woodland	150 Mailed 75 Returned	N
Solano-Yolo	11/5/2008	CURES	Woodland CAPCA Chapter- for PCAs - Review of water quality BMPs for chlorpyrifos and pyrethroids	Woodland	45 Attended	N
Solano-Yolo	11/19/2008	Yolo County Farm Bureau Education Corporation, Subwatershed Program	Seminar for Realtors, Lenders and Title Companies	Woodland	100 Invited 16 Attended	N
Solano-Yolo	12/2/2008, 12/3/2008, 12/4/2008	Yolo County Farm Bureau Education Corporation, Subwatershed Program	Irrigated Lands Seminar	Woodland, Clarksburg and Winters	1670 Invited 118 Attended	N
Upper Feather River	7/1/2008	UCCE, UFRW	Newsletter	watershed wide	120 Distribution List	Y
Upper Feather River	8/8/2008	UCCE, UFRW, Plumas-Sierra Cattlemen	Ranch Field Day	Sierra Valley	120 Distribution List ; 45 in Attendance	Y
Upper Feather River	8/20/2008	UFRW	Ranch Field Day Report	watershed wide	118 member mailing; 2 local newspaper	Y
Upper Feather River	8/25/2008	UFRW	2008 Exceedance & Communication Reports	watershed wide	118 member mailing	Y
Upper Feather River	9/26/2008	RCD, UFRW, UCCE, Plumas-Sierra Cattlemen	Sustainable Ag Workshop Focus on Water Issues	Sierra Valley Grange Hall	120 mailing list 60 in attendance	Y
Upper Feather River	9/26/2008	UFRW	Water Quality BMPs Power Point Presentation	SV Grange Hall	60 in attendance	Y
Upper Feather River	10/30/2008	UFRW	Membership Meeting - first annual Silver Shovel Water Stewardship Awards	Graeagle Fire Hall	125 mailing list; 25 in attendance; 11 awards presented	Y
Upper Feather River	12/4/2008	UCCE, UFRW	Prop 50 Irrigated Lands Stakeholder Meeting	Quincy Fairgrounds	125 mailing list	Not yet available

1. Previously reported for Storm Season 2008
2. This meeting occurred during Storm Season 2008 but was not previously reported.

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Conclusions and Recommendations

The Coalition submits this *2008 Irrigation Season Semi-Annual Monitoring Report* (SAMR) under the Water Board's Irrigated Lands Regulatory Program (*ILRP*). The SAMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize irrigated agricultural and wetlands related water quality in the Sacramento River Basin.

To summarize, the results from the Irrigation Season monitoring in 2008 continue to indicate that there are not major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin.

Statistically significant toxicity was observed in 10 of the 307 water column toxicity tests performed on 106 samples in the 2008 Irrigation Season. Nine of these results were considered exceedances of the Basin Plan narrative objective (3% of all toxicity results and 8.5% of water samples), with the remaining case being the result of lack of test replicate variability. No toxicity was observed in the 36 samples tested for sediment toxicity. For the sites with observed toxicity, the Coalition and its subwatersheds took the appropriate actions to address these issues. By its nature, the SAMR focuses in detail on the small number of sites and samples that exhibited toxicity and exceedances of conventional and microbiological parameters, as well as the actions taken and planned by the Coalition and its members to address these issues.

This SAMR characterizes potential water quality impacts of agricultural drainage from a broad geographic area in the Sacramento Valley from April 2008 through October 2008. To date, a total of nine Coalition storm season sampling events and 25 irrigation season events have been completed, with additional events collected by coordinating programs. For the period of record in this SAMR (April 2008-October 2008), samples were collected during seven scheduled Irrigation Season events and additional follow-up sampling at a total of 27 different locations, including follow-up sample sites.

Chemical results were evaluated for all of the cases of observed toxicity. In one case, concentrations of the herbicide diuron were determined to have potentially caused or contributed to the toxicity to *Selenastrum*. In a second case, chlorpyrifos was determined to have potentially caused or contributed to the toxicity to *Ceriodaphnia*. There were 3 samples that triggered TIE procedures to investigate the cause of toxicity. Toxicity was not persistent in 2 of the samples (i.e., there was no significant toxicity in the untreated baseline TIE sample), indicating a rapid breakdown of the source of toxicity, and therefore probably a short duration of toxicity in ambient waters. The remaining TIE indicated a metabolically activated, particulate-associated organic compound was responsible for the observed toxicity to *Ceriodaphnia*. Although some applied pesticides were consistent with these findings (chlorpyrifos and carbaryl), no pesticides or chemicals were detected that were consistent with the TIE results.

When detected, pesticides rarely exceeded applicable objectives, and were typically not associated with toxicity. Two registered pesticides (diazinon and atrazine) and 2 unregistered legacy organochlorine pesticides (dieldrin and DDE) exceeded applicable water quality objectives in a total of 9 Irrigation Season 2008 samples. There were no observed exceedances of the Basin Plan diazinon objective in the 2008 Irrigation Season,.

Many of the pesticides specifically required to be monitored by the *ILRP* have rarely been detected in Coalition water samples, including glyphosate, paraquat, and all of the pyrethroid pesticides. Glyphosate, one of the most widely used agricultural pesticides, has been detected in

only 7 Coalition samples to date, and has never approached concentrations likely to cause toxicity to sensitive test species. Over 98% of all pesticide analyses performed to date for the Coalition are below detection. This indicates that monitoring for many of these pesticides in water is unlikely to provide meaningful results regarding sources or needs for changes in management practices. Based on these results, the Coalition has proposed much more focused monitoring of ILRP pesticides in 2009, when the recently adopted revised ILRP MRP will be implemented. Similarly, the Coalition has proposed to conduct more focused monitoring of most trace elements (arsenic, cadmium, lead, nickel, selenium, and zinc) in 2009; the Coalition's monitoring has demonstrated that these metals do not exceed objectives and are not likely to cause adverse impacts to aquatic life or human health in waters receiving agricultural runoff in the Coalition watershed.

The majority of exceedances of adopted numeric objectives consisted of pH, conductivity, dissolved solids, and *E. coli*. Although agricultural runoff and irrigation return flows may contribute to exceedances of these objectives, all of these parameters are controlled or significantly affected by natural processes and sources that are not controllable by agricultural management practices. Follow-up strategies to evaluate causes of pH and dissolved oxygen exceedances were implemented by the Coalition in the 2006 Irrigation Season. Sources of *E. coli* exceedances have been investigated through a region-wide pilot study conducted by the Coalition. The Coalition also participates in the *ILRP* Technical Issues Committee (TIC) workgroups to develop procedures and guidelines for evaluation of exceedances. The TIC has worked with Water Board *ILRP* staff to develop recommendations incorporated into the revised *ILRP* Monitoring and Reporting Program requirements and procedures adopted by the Water Board in 2008 (*Order No. R5-2008-0005*).

The Coalition initiated Phase 2 monitoring elements during the 2005 Irrigation Season, concurrent with the Phase 1 irrigation season monitoring, and has continued these elements for most of the current monitoring sites. The Phase 2 elements monitored include additional pesticide analyses, trace elements, and nutrients. The Coalition implemented a strategy of monitoring Phase 1 and Phase 2 constituents concurrently for new monitoring sites implemented in 2007.

The Coalition has implemented the required elements of the ILRP since 2004. The Coalition developed a Watershed Evaluation Report (WER) which set the priorities for development and implementation of the Monitoring and Reporting Program Plan (MRPP). The Coalition successfully developed the MRPP and QAPP required by the *ILRP*, and these documents have been approved by the Water Board. Subsequent revisions requested by the Water Board have been incorporated into these documents and were implemented during the 2006 Irrigation Season monitoring, and continued for 2008 Coalition monitoring. The Coalition continues to adapt and improve elements of the monitoring program based on the knowledge gained through *ILRP* monitoring efforts.

The Coalition has implemented the approved monitoring program in coordination with its subwatershed partners, and has initiated follow-up activities to address observed exceedances. The Coalition has also completed a Management Practice Action Plan (provided most recently in Appendix G of the *2007 Irrigation Season Semi-Annual Monitoring Report*) designed to communicate information and monitoring results within the Coalition, to track implementation of management practices in the watershed, and to evaluate effectiveness of management practices. The Coaltion has developed a revised MRPP and Management Plan to meet the requirements of

the new ILRP MRP (*Order No. R5-2008-0005*). Throughout this process, the Coalition has kept an open line of communication with the Water Board and has made every effort to fulfill the requirements of the *ILRP* in a cost-effective and scientifically defensible manner. This semi-annual monitoring report is documentation of the success and continued progress of the Coalition in achieving these objectives.

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Appendices

The following appendices are available in electronic form on the CD provided.

Appendix A: Field Log Copies

Appendix B: Lab Reports and Chains-of-Custody

Appendix C: Tabulated Monitoring Results

Appendix D: Exceedance and Communication Reports

Appendix E: Pesticide Use Trends for Monitored Drainages

Appendix F: Site-Specific Drainage Maps

Appendix G: SVWQC Outreach Materials